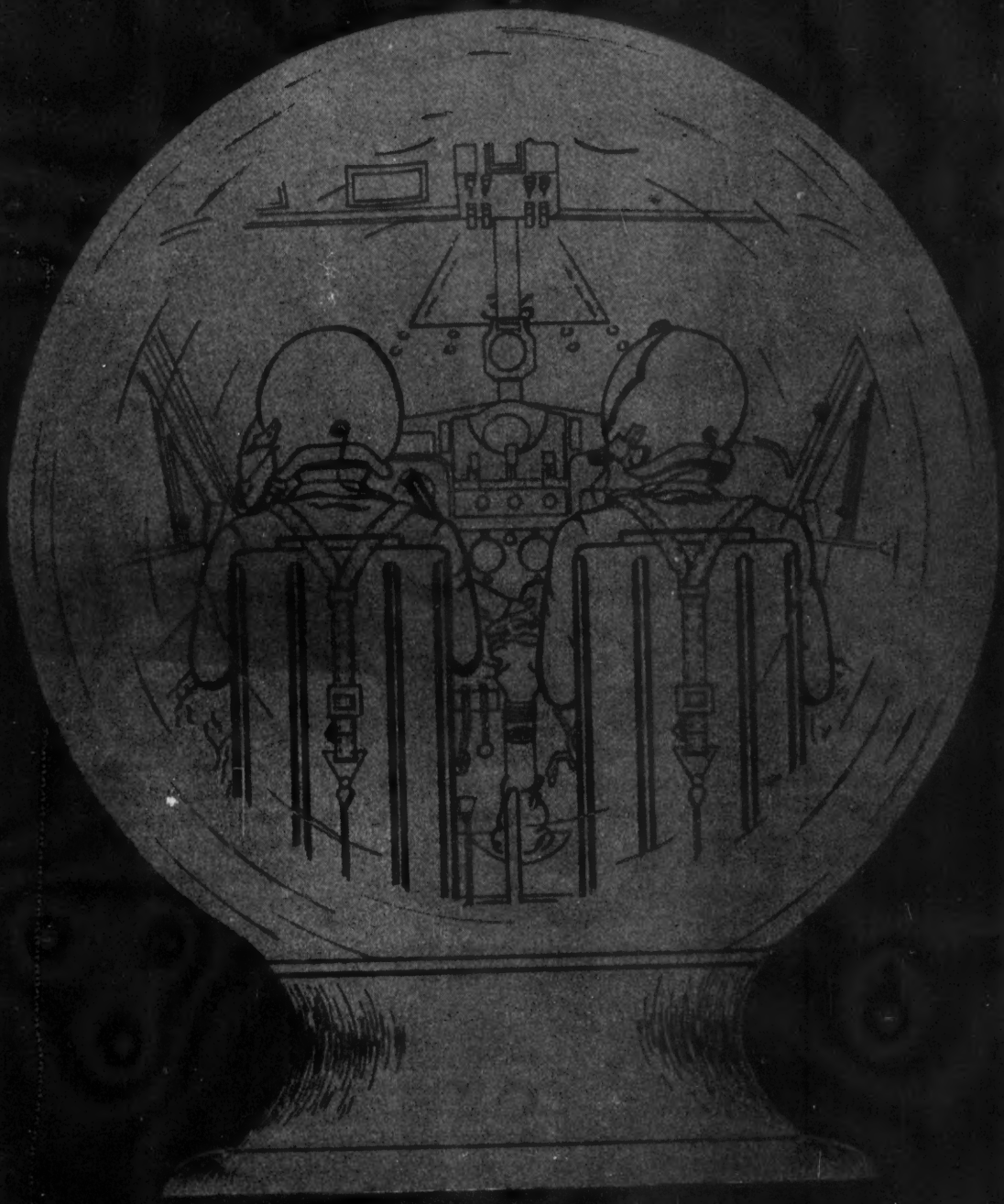
FEBRUARY 1961

UNITED STATES ARMY
AVIATION DIGEST



SORCERER'S APPRENTICE

United States Army

AVIATION DIGEST

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Know of a job well done? A new idea? A new way of doing an old job? Whether on operations, safety, maintenance, or training, if it's about Army Aviation let others in the program know about it. WRITE IT DOWN AND SEND IT IN. Pictures can tell the story as well as words — sometimes better. If you have pictures in your unit files on a particular operation your unit has performed or an unusual shot of Army aircraft, SEND IT IN . . . along with the who, what, where and when.

Whatever you may have to offer — a full length article, an "It Could Happen to You," or only a picture — is warmly received. Address material to Editor, U. S. Army Aviation Digest, USAAVNS, Fort Rucker, Ala.

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The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

Manuscrips, photographs, and other illustrations pertaining to the above subjects of interest to personnel concerned with Army Aviation are invited. Direct communication is authorized to: Editor-in-Chief U. S. ARMY AVIATION DIGEST, U. S. Army Aviation School, Fort Rucker, Alabama.

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Sorcerer's Apprentice

Richard K. Tierney

PAUL DUKAS tells in his symphonic poem "The Sorcerer's Apprentice" of a magician who could turn a stick into a servant. The magician's young apprentice desired to learn the magic words used to perform this miracle, but the sorcerer steadfastly refused to reveal them.

The determined apprentice finally learned the words by concealing himself and eavesdropping on the magician. He then successfully turned a pestle into a human figure and ordered it to fetch water. The order was obeyed, but the figure refused to heed a command to stop bringing water. The apprentice had failed to learn the magic words needed to turn the servant back into a pestle. The frustrated youth chopped the figure in two, but that only resulted in two servants hauling water to an already overflowing room. Fortunately, the magician arrived in time to correct the situation.

Army Aviators certainly do not indulge in sorcery, but their attitudes toward copilots and copilot duties can sometimes be compared to the sorcerer's relationship with his apprentice. Experienced Army Aviators too often ignore inexperienced copilots and do not take time to share their knowledge. This leaves the copilot with a feeling that he is not needed and he either half learns or does not learn at all.

How important are copilots to Army Aviation? It doesn't seem that they have much to do. They often appear to be joyriding and gazing out of the window. Occasionally they flip a switch or dial, look over charts, or perform other seemingly insignificant duties.

Aircraft commanders know this is a false picture and appreciate a good copilot's assistance, whether Army regulations require him for a particular flight or not. They know an efficient copilot is an important fail-safe factor. How many Army Aviators remember the value of this "insurance" when they are performing as copilots? How many make an effort to do a worthwhile job?

A copilot easily can minimize his position and make himself as useless as a passenger dreamily watching clouds drift past. But by devoting proper attention to his duties, beginning with the preflight check, the copilot can give the aircraft commander valuable assistance.

When a **good** copilot "gazes out of the window," he is actually on the alert for any aircraft that may be approaching on a collision course. When he is "flipping switches or dials," he most likely is changing radio frequencies or setting a new course on an instrument flight. While "looking over charts," he may be determining position, estimating time of arrival, or figuring true airspeed, thus freeing the aircraft commander for other duties.

A copilot can assist in many obvious ways. He is greatly appreciated during an instrument flight and approach in a high density area, especially in bad weather or at night. Minutes and even seconds become invaluable as an aircraft on instruments rapidly approaches the airfield. The aircraft commander has his hands full controlling the plane; he needs a copilot to help communicate with the tower and obtain approach and landing instructions. The copilot must continually help monitor the instruments, handle and read charts, and help scan the darkness or rain for the runway approach lights. He also must be prepared to instantly assume control of the aircraft if required.

Copilots, whether they realize it or not, also represent psychological factors that reflect on both the aircraft commander and themselves. Two individuals working side by side and constantly cross-checking one another, must have a mutual understanding of their situation and be able to work together — or conditions will prove miserable, perhaps fatal.

Consider the aircraft commander's position. He is responsible for his aircraft, passengers, and cargo. He must be sure of his copilot's ability before putting too much trust in him. Therefore, he will initially seem to minimize a new copilot's duties. This could tend to kill the initiative of many young aviators and make them feel that copilots are not important. The aircraft commander can guard against this by discussing the significance of the copilot's duties with him.

A novice aviator should be eager to learn from an experienced aircraft commander, and a little attention from the boss helps the apprentice feel he is part of the team.

Most junior officers in Army Aviation are well qualified aviators who as copilots would not hesitate to point out an aircraft commander's miscue, provided he too were a junior officer. However, too often junior officers hesitate or refuse to inform their seniors of pilot error except to prevent immediate catastrophe. This is a serious mistake since every individual is subject to err. A senior officer should be judiciously informed of an error or miscalculation. Such vigilance by the copilot tends to keep the aircraft commander on his toes.

The copilot should guard against an indolent attitude toward his duties. The efficient copilot quickly determines the characteristics and capabilities of the aircraft and its commander. He detects the aircraft commander's weak spots and then monitors and backstops. He must remember to work with, not against, the aircraft commander. Many aviators make it a point before a flight to inform new copilots of the duties expected of them. If the aircraft commander does not do this, the copilot must play it by ear in an effort to work harmoniously and thus ensure as pleasant and safe a flight as possible.

Copilots are required on Army Aviation flights under various conditions as described In AR 95-2, par 23. In addi-

tion, when transporting passengers in CONUS the crew of each transport helicopter must include a copilot who is qualified in the type and model aircraft being operated (par 9a, Annex F, USCONARC Training Directive, 19 Jan 60).

The H-37 (Mojave) is the only Army aircraft that requires a copilot under all flight conditions. The twin-engine H-37 cannot be flown safely by one aviator. A constant grip must be maintained on the flight controls, especially while carrying or lifting heavy loads. A sudden loss of rpm must be quickly corrected by the copilot while the pilot maintains the proper attitude of the aircraft. There is no time for questions or interpretations of individual feelings. The aviators must work together instantly or the H-37 may fall.

The same holds true while landing or taking off in the H-37. The aircraft commander has his hands full flying. A copilot is necessary to unlock or lock the tailwheel; place fuel boost pumps on emergency; change the fuel mixture to rich; raise or lower the landing gear; maintain equalized manifold pressure; and keep the fuel transfer pumps operating.

The need for teamwork between pilot and copilot is recognized as a must. Teamwork is stressed in the 12 hours of copilot training given in addition to the 35 hours of first pilot instruction in H-37 checkout flights at USAAVNS, Fort Rucker, Ala.

Whether the copilot is aboard an H-37, or required on another flight, or just "buddy riding," it is easy to see his potential value as a safety factor. How to change this potential into reality is the difficult part. It's a two-way street, requiring mutual understanding and teamwork. The aircraft commander must be able to accept constructive criticism without resentment and be willing to pass on the knowledge he has gained from experience. The copilot should know the aircraft and its commander's capabilities; do a conscientious job; and be willing to benefit from any informal instruction offered.

A good copilot indicates a good professional aviator and represents one of the best safety factors possible aboard an aircraft. □

A PATROL from "C" Company was sent on a reconnaissance mission two days ago. Radio contact with this patrol has been lost for one day. A pilot flying an L-19 aircraft has been requested to establish radio contact with the patrol. If radio contact is made, the pilot is to determine the patrol's location and relay the information to a helicopter which is standing by to evacuate the patrol. The patrol has an AN/PRC-10 radio operating on frequency 35.2 mc; its call sign is Mainsail 10. You are the pilot assigned the mission and you are presently flying over the forward battle area. After making contact with the patrol on the ARC 44 radio, the patrol leader states that he is disoriented and unable to give the pilot the patrol's location. Your mission is to locate the patrol. Which one of the following actions would you take?

(1) Request that the patrol display some type visual identification marker and begin a search pattern of the area.

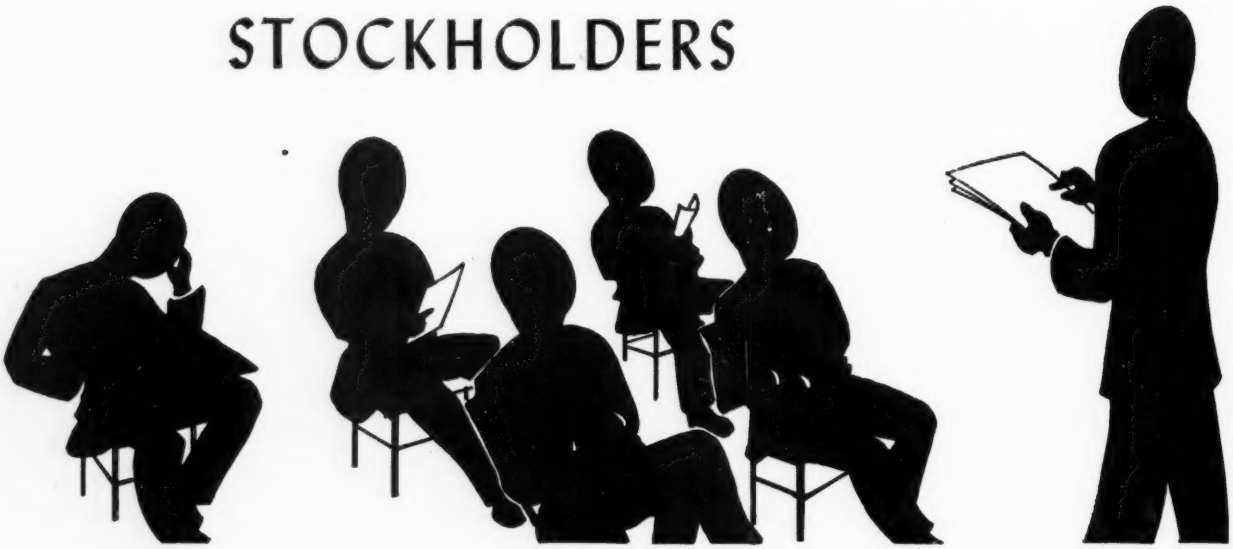
(2) Using the loop antenna and tuning the aircraft radio to 352 kc, have the patrol key their mike; and home to their position using the oral null procedure.

(3) Request the patrol key the mike of their radio. Then take two or three bearings with your ARC 44 homing device, establishing their position by intersection.

(4) Request the patrol key the mike of their radio. Then change the communication-homing switch in the aircraft to the homing position, turning right when you hear a "U" (..—) and left when you hear a "D" (—..), until an on-course signal (steady tone) is received by the pilot.

Solution to Puzzler will be found on page 11.

REPORT TO THE STOCKHOLDERS



Lieutenant Colonel Morris G. Rawlings

IT IS CUSTOMARY, in some businesses, to accompany small dividend checks with an elaborate statistic - studded report attempting to explain why the return wasn't greater. As dividends grow larger, reports grow smaller.

This is the "report" of the Army Aviation within a corps for the period beginning 1 July 1959 and ending 30 June 1960. It contains a fair amount of statistics, but no dividend check. When you have read it, you will probably have one of three reactions:

(1) "I knew it all the time."

(2) "The man is crazy."

(3) "Ugh."

Within the units of the corps, 347 aviators (63 on ground duty) flew a total average of 235 aircraft for a total of 68,-943 hours. They were kept in the air through the combined

MONTH	HOURS FLOWN		IN 68% AVAILABLE AIRCRAFT		WITH ACCIDENTS
July	6,766		157		1
August	6,062		163		0
September	7,627		168		0
October	5,463		155		1
November	3,127		157		1
December	3,512		158		2
January	3,673		163		2
February	5,147		168		1
March	6,082		158		5
April	6,692		158		5
May	7,592		155		1
June	7,200		155		1
TOTALS	68,943	IN	157	WITH	20

Col Rawlings was assigned to V Corps, Seventh Army.

efforts of 376 mechanics and a field maintenance company. They suffered 20 major accidents, and two fine young aviators were killed.

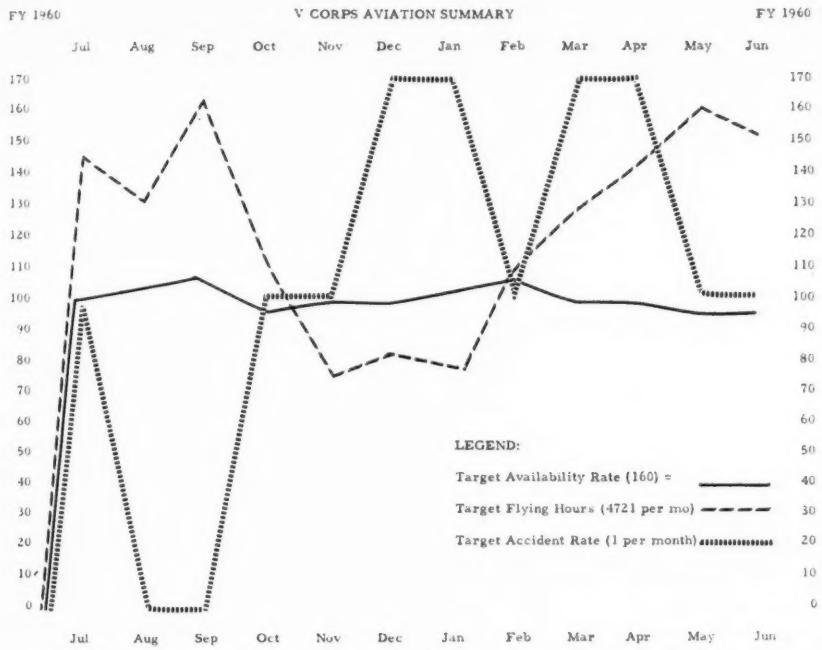
Taken more gently, these statistics are shown on page 4.

An additional 2,800 hours were flown by these aviators in "float" aircraft loaned to them by the TAAM Co. However, these hours accrue to the owning unit rather than to the using organization.

Trends are difficult to recognize through figures alone. A graph is more comprehensible, but it is obviously impracticable to construct one which will allow for one accident to be presented against 7,600 flying hours in a mathematical progression. A comparison can be drawn only if predetermined goals can be used to represent the average or 100 percent line.

What is the goal for flying hours? Those figures are shown by SB 1-1 and legitimatized by AR 95-70. The purchase of spare parts and required maintenance are computed upon these programmed flying hours. For our aircraft 4,721 hours per month were programmed. This figure is at the 100 percent line on our graph.

Our target for aircraft availability is 68 percent of the total assigned. Of our 235 aircraft, 160 in flyable status represent the 100 percent line on our graph. A target for aircraft accidents is more controversial. For our purposes, it is proper to anticipate one accident in approximately 5,000 hours of flight. This goal, representing one accident per month, is also at our 100 percent line. Here is the graph:


FY 1960
V CORPS AVIATION SUMMARY
FY 1960
Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
LEGEND:
Target Availability Rate (160) =
Target Flying Hours (4721 per mo)
Target Accident Rate (1 per month)

Taking each line of the graph in turn, four facts can be drawn from the line representing our flying hours.

(1) Corps units exceed programmed maximum (125 percent) during 7 months of the year.

(2) They never fall below programmed minimums.

(3) Average utilization is at 123 percent of the programmed flying hours.

(4) Flying hours fluctuate widely from month to month.

From our availability rate, two facts become readily apparent.

(1) The rate remains relatively constant throughout the year.

(2) Peaks are reached at the end of the summer season and in midwinter.

From the accident rate, these facts are determined:

(1) Accidents, flying hours, and aircraft availability never reach simultaneous peaks.

(2) **The accident rate is at its lowest when flying is at its greatest.**

These facts permit certain generalizations which could be considered by those who establish policy. The first of these relates to the availability of aircraft as opposed to the number assigned.

Aircraft utilization is not adversely affected by maintenance requirements.

Look again at the graph. During the month of September, units flew at a peak number of hours while availability also rose. However, in May, the units again exceeded all programmed flying hours while availability dropped to its lowest point. Of the 7 months in which flying exceeded all programmed hours, only 2 found us with more than 160 aircraft available.

Here comes the question from commanders, "Are you trying to tell me that you would fly as much in 160 aircraft as you would if all 235 were operational?"

"Yes sir. Look at the record. We flew 68,943 hours in organic aircraft and 2,800 in 'floats' for a total of 71,743.

Had each of our 235 been flyable every day, and had we flown at the maximum rate of 125 percent of that programmed by SB 1-1, we would have flown only 70,815."

"Forget the 'floats.' We're talking about our own equipment."

"Yes sir. In that case, we would have been allowed 1,872 hours of additional flying to reach our maximum. Stated another way, a 33 1/3 percent increase in aircraft would have netted us only 2 percent of our flying time."

The commander may or may not be convinced. He is at least ready for the next generalization:

Decreasing aircraft utilization to any amount greater than zero will not result in a decreased accident rate.

This is obvious, but not necessarily understood. The rate is dependent upon the number of accidents per 100,000 flying hours; therefore, a decrease in hours **and** accidents does not change the rate.

My answer:

"Aircraft accidents can best be reduced by increasing the number of flight hours which all aviators obtain."

During August and September, our aviators are at their best. The weather is, and has been, good. They have the spring practice months behind them. We have had no accidents. Comes winter with its bad weather, and the "fair-weather" man drops out after an accident. Comes spring, and the rusty aviator bangs up another machine getting current again. The cycle occurs over and over. **Accidents do not occur in this corps to those aviators who consistently average 300 hours each year.** Part-time aviators will seldom reach this amount. More bluntly, semi-professional aviators will never be accident-free.

It is customary for a stockholder's report to be closed in one of two ways. Either the report itself is so flowing as to require only self-congratulations on the part of the directors, or the final paragraphs are devoted to those planned changes which paint a rosy future.

We congratulate ourselves on our flying record in that we did our job well and still remained within the budget. We make no apologies for our maintenance record, and consider that an increase in flyable aircraft will be purchased only by an excessive expenditure of money and time.

We admit that our accident record must improve. Frankly, we do not consider this a necessity to retain aircraft, nor for economic reasons. Our real and irreplaceable loss is manpower. Two fatalities and six hospitalizations are a great price to pay for peacetime preparations.

We must ensure that those who, for reasons beyond their control, are not fully proficient are not assigned missions beyond their capabilities. Further, we will insist that our most proficient aviators accompany those not fully proficient on all flights when the slightest doubt of successful completion may occur.

We shall continue to stress a mandatory 8 hours of training per week for all aviators, regardless of their duty assignment.

We shall insist upon placing supervisory error on those who assign missions which result in accidents, where such accidents show proper supervision could have prevented them.

We shall insist that "pilot error" be more carefully defined — as errors in judgment, in technique, or as the result of a violation of regulations.

We shall try to more thoroughly indoctrinate commanders with their responsibilities as opposed to those actions for which the aviator must take full responsibility.

We shall never apologize for, nor make disparaging remarks about, that group of Army Aviators and mechanics who perform dual roles in the service of the stockholders. □

The following excerpts are taken from a letter by General Clark L. Ruffner, quoted in Letter No. 15 to Army Aviators by Brig Gen Clifton F. Von Kann, Director of Army Aviation.

"I do not advocate the reduction of a single, solitary tactical mission ever in order to have a lower accident rate. I advocate command attention, emphasis, leadership, and constant harping on the subject to wake these young boys up.

". . . while I commanded the 2nd Armored Division in Europe, we flew twice the number of hours of any other division in Europe in one year . . . and we had but one accident. . . . we flew tactical missions, we flew them when no one else was flying them, and we didn't let safety interfere with tactics. . . . I attribute full credit for this successful program to my Division Aviation Officer."

TAKE A LOOK

C. FLIGHT PLAN

RADIO CALL: R72787	AIRCRAFT TYPE: TL-19D		POINT OF DEPARTURE: CAIRNS AAF	
ROUTE TO BE FLOWN			BASE NAME OF DESTINATION: MIAMI INTERNATIONAL	
IFR	VFR	ALTITUDE	ROUTE	TO
✓		5000	D→	DHN
✓		5000	V-7	CTY
✓		5000	V-159W	OCF
✓		5000	V-159	PBI
✓		5000	V-3	MIA

MILEAGE: (484) NAUT. — ETD: 1300Z
EST TRUE AS: (107) KTS. — ETE: (4+17)
ALTERNATE: N/A — ETE TO ALTERNATE: N/A
TRANS. FREQ.: UHF-16
PILOT'S LAST NAME: KORECT
FUEL ON BOARD: (5) HRS. (15) MIN.

INSTRUMENT RATING

NAVY	AIR FORCE	ARMY
SPECIAL PILOT	PILOT RATING	PILOT RATING 3
STANDARD PILOT	INST RATING	INST RATING 2

DATE INSTRUMENT CARD EXPIRES: 10 DEC 60
DD FORM 365F FILED AT: N/A — DATE FILED: N/A
HIGHEST RANK ON BOARD: N/A

LETDOWN EQUIPMENT ABOARD AIRCRAFT						LETDOWN AVAILABLE AT DESTINATION							NOTAMS CHECKED	
✓ ILS	✓ VOR	✓ ADF	✓ RADIO RANGE		TACAN	✓ ILS	✓ VOR	✓ ADF	✓ GCA		RADIO RANGE	TACAN	✓ YES	NO

REMARKS

J. M. Korect
(SIGNATURE OF PILOT)

D. WEATHER

EXISTING	DESTINATION: 8⊕2H↘10 — TIME OF OBS		FORECAST	DESTINATION (ETA): I 2 HOURS 010↘8	
	ALTERNATE — TIME OF OBS			ALTERNATE (ETE)	
ROUTE FORECAST	MIN CIG: 300 AT OZR	MAX CLD TOPS: 7000 FT MSL		THUNDERSTORMS — TURBC — HAIL	
	MIN VIS FLT LVL: ZERO IN CLDS	DUST OR HAZE —		SMOKE — RAIN — FOG	
	MIN FRZ LVL: 10,000 FT MSL	ICING —		FRZ PCPN — SNOW —	BRIEFING VOID AFTER: 1330Z
	WINDS: 5000 MSL 300/10K			SIGNATURE: U.R.Safe CWO	

E. FLIGHT CLEARANCE AUTHORIZATION

IS ANYTHING wrong with the extracted portion of the DD 175? Items which we believe most aviators and operations officers might question have been circled. First we notice that the aircraft is a TL-19D. Immediately the remaining four items come into focus, particularly the "fuel on board."

Since this particular item for the TL-19D is questioned by many, believed by few, and has been the source of "red faces" for some, let's carefully scrutinize the TM 1-1L-19 (T) D-1.

The cruise charts in the manual show fuel consumption of the TL to range from better than 6+50 at a minimum continuous power to 3+20 at maximum continuous power at 5,000 feet. Here are some examples taken directly from the charts.

RPM	MP	GPH	Total Time	TAS (Knots)
1900	16"	6.4	6+24	82
1900	20"	7.75	5+15	107
1900	24"	10.2	4+01	119
2100	20"	8.8	4+39	*
2100	24"	10.8	3+48	122
2300	24"	12.3	3+20	128

*Not computable from the charts.

These figures are based on a lean mixture, 5,000 feet MSL, a gross weight of 2,400 pounds, and a standard day.

Our pilot has elected to use a power setting of 1900 rpm and 20" manifold pressure, which give him a true airspeed of 107 knots. Now take a second LOOK at the DD-175. Is this flight plan valid and within tolerances? Can the pilot fly 484 nautical miles in 4 hours and 17 minutes, maintaining his required reserves without refueling? Allowing 1 1/2 gallons for warmup and takeoff, according to all available information, the flight plan IS valid.

If you desire, verify this information by running some fuel consumption checks on your aircraft, flying according to the -1. If there is a major variance from these handbook figures, submit a UER. □

Let's Integrate Now!

Colonel Allen M. Burdett, Jr., Inf

TO INTEGRATE or not to integrate, that is the question. This important point regarding Army Aviation is still being widely debated by many people and groups both in and outside the Army.

Should aircraft be assigned to the subordinate units of our divisions, or should they be retained under centralized control at division level?

The Combat Developments Office of the U. S. Army Aviation School has recently completed an "in house" study on whether or not aviation should now be included as an organic component of the subordinate units of the division. This study has been approved by the Commandant and its recommendations are being implemented.

In preparing the study, personnel of the Combat Developments Office maintained close coordination with the field and with the user branches. Their wants and needs were carefully considered.

User desires are expressed in studies prepared by the various service schools. An Infantry School study, for example, has stated a current requirement for at least eight utility VTOL aircraft per battle group. These aircraft are needed to further the Infantry's capability for sustained ground combat operations. The Armor School has stated a current requirement for a significant increase in the number of aircraft for each armored division with organic aircraft for each tank battalion, for each armored infantry battalion, and for each ground troop of the reconnaissance squadron. The Artillery and Missile School has long been on record as wanting organic aircraft for the division artillery. **In essence, the branch schools of the combat arms favor aviation which is organic to the subordinate combat elements of the division and the retention of a sizeable aviation unit at division level.**

In developing the study, the Combat Developments Office considered many valid arguments for retaining centralized control of aviation at division. These are the principal advantages of centralized control: ease of control, relative ease of maintenance, better aircraft utilization rates, fewer support personnel required, and better supervision of all aviation activities to include flight safety and unit training. These are cogent reasons for retaining the present organizational structure and for expanding the division's aviation company into a battalion to better meet the additional user needs.

At first glance, the experience of the 82d and 101st Airborne Divisions tends to substantiate the foregoing. A closer look, however, discloses a fundamentally different requirement for the organization of aviation within the current ROTAD division. The primary reason for the airborne desire to retain centralized control of aviation can be attributed to the different method of entering combat. During the parachute assault phase of an airborne operation, the battle group and division artillery commanders have no way of controlling or employing Army Aviation. For that reason, it appears better to retain aviation under division control until after the airhead has been seized, bring in the aircraft still under division control, and then attach in accordance with the priorities of the subordinate units. Thus, because of its different role and mission, the airborne division has a different requirement for its organization of organic aviation. For this reason, the Combat Developments Office agrees that aircraft should not be integrated into the subordinate units of the **airborne** divisions but should be retained at division level as a TOE aviation battalion.

On the other hand and despite a resulting increase in maintenance and control problems, our study concluded that aircraft should now be integrated into the subordinate units of the current **infantry** and **armored** divisions. In arriving at this conclusion, the outstanding contravention seemed to be the desires of the users (for example, a great majority of the battle group commanders want their own aircraft) versus the argument that the machines currently in the inventory are too complex for assignment below division level.

Regarding user wants, we agree that if aircraft are assigned where they are habitual-

Col Burdett is Director, CDO, USAAVNS, Ft Rucker. He is fixed wing rated and instrument qualified.

ly needed and employed, such aircraft will be more responsive to the desires of the commander. Furthermore, by assigning aircraft to subordinate units we feel that the combat arms will thereby develop an even greater appreciation for the capabilities of Army Aviation as well as a keener awareness of its inherent problems.

Regarding the maintenance complexities, similar arguments were advanced when wheeled vehicles were first introduced into the infantry battalion and when the more complicated tanks were first issued to tank companies. As with the wheeled vehicle and the intricate tank, some maintenance difficulties can be anticipated if aircraft integration is pursued. To preclude as many pitfalls as possible, the subordinate units which have organic aircraft must be given adequate resources for maintenance. With those resources, the subordinate units must, as in the past, perfect the techniques for maintaining the ever more complicated items of military hardware.

The trend of the future appears to favor integrated aviation. Many studies of future organizations have outlined this trend. If the prevalently expressed belief that air vehicles will eventually be organic to rifle companies is valid, this presupposes a decentralization of control and responsibility for aviation throughout the division. It appears that a phased program should be adopted to smoothly transition from our present completely centralized control of aircraft to a system which is decentralized. Such a transition plan would provide for the gradual assumption of operations, maintenance and safety responsibilities by subordinate units. The action proposed in our study represents the first step of such a transition plan for the current infantry division.

Action recommended by CDO's study is now underway. The first move was a proposal to the Infantry and the Artillery and Missile Schools concerning integrated aviation. The views of these schools were requested on the organization of aviation platoons for the battle groups and division artillery of the current infantry division.

The next action is the formation of the "DOUGHFLY" Platoon here at Fort Rucker. This is a provisional organization which CDO, in close coordination with the Infantry School, will tailor to the specific needs of the battle group. The DOUGHFLY Platoon is a provisional unit within a provisional unit; it is manned and equipped by resources of the 8305th Aerial Combat Reconnaissance Company (Experimental). After appropriate doctrine and tactics have been ironed out and its detailed organization established, we plan to send the provisional platoon to Fort Benning for demonstration, testing, and further study.

As a follow-on to DOUGHFLY, the study recommended the formation of a "CRUNCHER" Platoon. This will be an aerial tank - hunter - killer unit for primary use at division level. It could be a part of the division's combat aviation company or of the armored cavalry regiment. The CRUNCHER Platoon, will be organized from resources available to the 8305th ACR Company (X).

The concept of integrated aviation obviously requires more aircraft for our divisions. This, however, is in consonance with the stated needs of the user branches. More aircraft in the divisions will, in turn, require more personnel spaces. To fulfill the stated requirements of the users, more spaces must be made available, and adequate funding must be programmed for additional equipment.

The concept of integrated aviation may very likely require the creation of an aviation battalion for the current ROCID and ROCAD divisions. More aircraft in the divisions will necessitate an additional third echelon maintenance capability. This requirement can best be met by the creation of an aircraft maintenance company for each division that has integrated aviation. The activation of such a company or the creation of an airlift company, as has been frequently proposed, will undoubtedly require the formation of an aviation battalion. The exact composition of such a battalion cannot be precisely determined at this time; its evolution, nevertheless, is almost certain. With anticipation CDO looks forward to the development of such a unit.

Taking first things first, however, CDO says let's integrate now. Let's give the combat arms what they want. Their wants are known. The means are available. The time is ripe. By integrating now Army Aviation can make a more significant contribution to accomplishing the ground mission of the combat arms and thereby increase the overall effectiveness of the United States Army. □

The Case of Sergeant X

I ARRIVED just as the ambulance left for the hospital.

"What happened?"

"Somebody just walked into a prop; he looked like he was cut up pretty bad."

"Who was it, a civilian?"

"No, a soldier—a mechanic who had been around aircraft for years."

A man wondered aloud, "Why does a guy with so much experience suddenly just walk into a spinning propeller?"

Nobody answered, but in the silence that followed we all sought the answer. It might be complacency, worry, or fatigue. In this case it was a combination of these factors, accented by an unsafe habit.

"Sergeant X was a good mechanic. He'd never been involved in an on-the-job accident," his CO said. "He knew all the safety precautions around props and even taught them to our new mechanics."

Sergeant X started in aviation maintenance with a fear of propellers. He considered ALL props hot and made a point of developing safe habits around them. He was a bug about staying clear of the propeller's arc, even when the aircraft was shut down. He would make sure that all switches were off and powerlines disconnected while working on an aircraft.

If it were necessary to work around a spinning propeller, Sergeant X would hold onto something solid or steady himself in some way. This minimized the chance of flicker vertigo (induced by the spinning blades) or some other factor causing an accidental slip into the prop.

When he knew a prop was hot he insisted that a warning flag be pasted on the propeller. This served as a reminder to the men working on and around the aircraft.

Sergeant X applied his safety rules around helicopters as well as fixed wing aircraft. He would always approach or leave a fired-up chopper from its front. "The pilot has plenty to do just handling that ship," he'd tell many an apprentice, "and you can't be sure he always sees you. If you're fooling around behind him, he could back right into you."

"Another thing," he'd add, "bend over while running around under those blades. At times they're lower on the tips than in the center and a gust of wind could blow one down on your head. And don't forget to look where you're going. If you're on a slope you could run uphill—right into that blade."

Courtesy rules also became a habit with Sergeant X. Before cranking up he'd clear all equipment and debris from the vicinity of the plane. While running up a fixed wing aircraft he was careful to make sure he was not blowing rocks, dust and dirt at someone else. Flying debris, dust, etc., can cause painful injury or a damaged propeller that could fail in flight.

"Prop clear? . . . Switches on." Sergeant X followed the preflight procedure even if the nearest person was a block away. It, too, had become a habit with him—a good habit to have.

Sergeant X had attended ground safety classes and listened closely. He was a good supervisor and stressed safety points covered in the classes to his subordinates.

This, then, is the sort of person who suddenly "just walked into a spinning prop." But it is only the surface picture. There was an undercurrent of overlapping factors involved.

Subtle signs of complacency had set in as Sergeant X had become more experienced. Here and there he trimmed the margin of safety "to speed up the job." **He left no allowances for worry, fatigue and preoccupation.**

Illness in his family plus financial problems had kept Sergeant X awake nights for about a week before the accident. He was tired, mentally and physically, when he reported for

work on the morning of the accident.

Sergeant X had been working on L-19s and L-20s for several months, but since they were shorthanded that morning, he decided to help out on an L-23 that was a priority job.

The stage was set. A tired man, with problems on his mind, approached an area where four aircraft were running up. Nearby an L-23 sat idling and waiting for the pilot's hand to transform it from a dormant mass of metal to a pulsating bird, soaring in the sky.

Spotting Sergeant X approaching, the L-23 pilot signaled for chocks out on number one. The engines were running well as Sergeant X pulled the chocks from the left wheel. Taking a shortcut under the left wing he pulled the nosewheel chocks. Sergeant X pitched the chocks out to the left of the aircraft; then, crouching, he started under the right wing to pull the right wheel chocks. Through a combination of fatigue, worry, preoccupation and **an unsafe habit,** he walked through the tip of the number two prop. WHY? He had gotten away with this unsafe habit, or shortcut under the wing, many times the past few months. But this time the circumstances were just right to trap him.

The key factor in this accident was the unsafe habit of ducking under the wing. Sergeant X had fostered and kept many safe habits, but walking AROUND the wingtip was not one of them. Had habit "forced" him to walk around the wing, this accident would not have happened.

An unsafe habit recently played a key role in an accident caused by flicker vertigo. An Army mechanic failed to properly brace himself while tracking an H-13 tail rotor. Completely engrossed in his job, he slowly advanced a padded stick to a point where it would contact and mark the blade that was out of balance. Suddenly he became dizzy and fell toward the aircraft. He reached out to grab the tail boom extension, but missed and plunged his arm into the spinning blades. Sunlight dancing on the blades had induced vertigo.*

If the mechanic had formed a safe habit of bracing himself while working around spinning props, he would not have fallen forward. Here, as in the case of Sergeant X, a safe habit could have prevented an accident.

Similar accidents could occur around other helicopters as well as fixed wing aircraft. Flicker vertigo can be induced in a matter of seconds — depending on the circumstances and the individual. YOU could be next.

We cannot always control worry, fatigue, complacency, or certain types of accidents. But ALL OF US CAN DISCIPLINE OURSELVES WITH STRICT, SAFE HABITS around aircraft. ONE unsafe habit can be fatal . . . as in the case of Sergeant X. □

*Flicker vertigo most often occurs at 11-20 cycles per second, but can occur at other speeds depending upon the angle of the sun to blade surfaces, the angle of the blades and the position of the observer.

Solution to this Month's Puzzler

The best solution is number 4.

The fastest method available for the pilot in locating the patrol is the homing device which is part of the ARC 44, FM radio in the aircraft. After establishing voice contact with the patrol on the ARC 44 have the patrol key their mike. The pilot then changes the communication - homing switch in the aircraft to the homing position and turns the aircraft until the steady on-course signal is heard, turning right when he hears a "U" (..—) and left when he hears a "D" (—..) homing on the patrol's radio. Immediately upon passing the patrol's position, a reversal of off-course signals will take place.

Solution 1, request to display visual identification markers, is not considered the best solution because of the additional time involved in executing a search pattern.

Solution 2, using the oral null procedure with the loop antenna, cannot be used because the low frequency radio will not net with the AN/PRC 10, FM radio.

Solution 3, using the intersection method with the ARC 44, is not as accurate as homing directly to the patrol and would be more time consuming.

References: TM 11-517, changes 1-5, par 3, 4, 8, 18 through 25, 27 through 31, and 129. □

GOOD(?)OLE DAYS

Leo E. Carver

OCCASIONALLY one encounters an aviator type of the old school who sighs deeply for the "good ole days" of 1941-1945. In his memory lingers the picture of flight training during this period when "instructors instructed and students learned"—or else! In his memory, diluted by time and nostalgia, all students were eager and all instruction perfect; a condition brought about primarily by the lack of interference from desk jockeys and paragraph troopers with their fetish for improving the training situation.

Further conversation with this ardent advocate of turning the clock back generally reveals that he was an instructor and not a student during this Utopian time frame.

The obvious gain for the modern pilot is the standard-

Mr. Carver served in Europe as a fighter pilot during World War II. A former Air Force flight instructor and qualified Army flight instructor, he is General Manager of the Hawthorne School of Aeronautics, Army Contract Primary Flying School at Fort Rucker.

ization of methods. What the current instructor may lack in individualistic flash, he makes up for by standardized instruction. These techniques have been decided upon neither lightly nor arbitrarily, but only after a good deal of argument, head scratching, thought, and experience on the part of the school authorities.

The "do it my way or else" philosophy has been replaced by the school approach, to the advantage of the pilot. Safer flying methods have been incorporated in these standard performance requirements.

Organization is felt in the classroom, by the instructor, and in the manuals currently being used. The advantages of attempts to make a more exact science out of flying are many to the student and there are those who feel the end product is a better one.

It was easy to recognize the primary instructor in the old days. Although frequently younger than his students, there was no mistaking the parachute silk scarf (preferably scorched by fire on one edge) and the oversize wristwatch with its baffling array of gadgets. The students could always be identified by a look of perpetual worry.

Regardless of how low or high the standards, teaching a student to fly can be a frustrating and nerve-wrecking experience, taxing the instructor's judgment and ability to the utmost. The decision to solo a student is always a momentous one. It is a rare instructor who can calmly munch a sandwich at the runway control unit while his charge becomes airborne and makes that first approach and landing. The instructor who, in a show of bravado, attempts to eat during supervised solo will, sooner than later, become badly choked. Instructing is a hard and demanding responsibility.

By the same token, student problems were just as real to the student as those experienced by the instructor. As a cadet undergoing aviator training in the "good ole days," I don't recall them as being good at all. As cadets, we did not have the rights of an enlisted man nor the privileges of an officer. If we did, no one told us because in many cases the supervisors were too busy telling us how stupid all cadets were and foretelling dire and horrible results for the war effort if, by some administrative fluke, we became rated aviators. As a young and tender lad a long way from home, I found these preflight briefings somewhat discouraging. This feeling was shared by other less hardy souls.

Instruction in the air was generally of the "monkey see, monkey do" type. Analysis of student errors was seldom attempted. This would have been interpreted as making it too easy for the student who was supposed to attain this information solely by individual trial and error.

Debriefings were generally short and concise, although accompanied with some ceremony. In my case I was generally put in a "brace" while the instructor stood, feet apart, glaring at me. At the moment my knees began to buckle, he would utter an unsanitary word and walk away. In all fairness, I must admit that I was no "Hot Rock." In truth, I wasn't even a "Smouldering Boulder." I'm sure I would have taxed the patience of Job, but the debriefings did little more than freeze my brains and leave me numb with despair. It was all I could do to add my voice to the others as we, upon command, broke into the strains of the Army Air Corps song at the precise moment we marched under the entrance arch to the cadet area.

During my entire training as aviation cadet, I was never counseled privately or told my grade for a flight. Students were not permitted to see their grades or flight records. None of us really knew what our progress was. For all we knew, each day on the flight line was our last. Most of us didn't buy officer uniforms until after graduation.

True, there were good instructors dedicated to their jobs and students who excelled because of instructor dedication, but these individuals rose above the standards and concepts prevalent in that day. Admittedly, pressures are too great and needs too urgent during a hot war to allow time for an objective and comprehensive study of how to improve a training program. However, in some cases, the program was handicapped unnecessarily by attitudes that could have been changed within the framework of existing time frame and facilities.

You may rightly ask me what I'm griping about since I made the program and the overall training was good enough to win a World War. It's a good question and really I'm not complaining. Maybe I'm guilty of remembering only the trying times of the "good ole days." I can even smile now as I remember. I was proud of those wings and my branch of the Service. So proud,

in fact, that I resolved, if opportunity ever permitted, to do all I could as an individual to improve the flight training received by military students.

There is no way for a student to learn to fly in a military program without keen desire and diligent application. The program requirements are rigid but today the student has the advantage of a student-centered flight and academic program. Teaching techniques have undergone revolutionary changes. Emphasis is on providing opportunity for the student. Every encouragement is given short of compromising the program standards. The dignity of the individual is recognized.

While, basically, flight instruction remains the same, some courses have been beefed-up, others tailored to suit the electronic age that has replaced the fly-by-the-seat-of-the-pants time that was.

There are many old timers who will say they don't teach the boys to read maps anymore, but navigation courses have been increased in hours and the subject broadened to include such aids as omni and ADF.

Weather, space satellites notwithstanding, has become an increasingly complicated subject, but one that will always remain of paramount interest to the pilot. This course too has become more sophisticated. Elementary instrument flying is given, as it has been for many years, but the aviator of today hopes to become instrument rated eventually and therefore his interest is keener and the subject explored more fully.

All of these subjects combined with the growing complexity of modern aircraft makes for a deal more book-cracking than the Cub days.

Giant steps in training have been made. Still there is room for improvement and new approaches in the training field. There always will be. It is a stimulating challenge and one that is now accorded its proper place in Army Aviation. No, don't give me the good ole days. I've had them, and I like the good new days better. □

ALL AVIATORS: ***When you're down to published minimums and still in the soup, are you . . .***

GONNA COME IN ANYWAY?

Did you ever shoot a GCA that was so good, so smooth, and so well controlled that it seemed you were sliding down a wire anchored to the centerline of the runway?

Sure you have, and you have probably thought to yourself, or said aloud, that you would follow one like that right down to the ground on a zero-zero night.

But then on the other hand, you've probably shot other approaches — not so precise — when you uttered a prayer of thanks that there wasn't a cloud in the sky. For some reason or other either you, the controller, or the equipment wasn't working right and you couldn't have hit the field with a bomb.

Often the bad misses are caused by a trainee controller. But he's got to start sometimes and the only thing he has to practice on is you. Don't worry about a precision run under actual IFR conditions; only skilled controllers are authorized to control your aircraft then.

There are at least four variables which can make the situation more binding: controllers, the radar equipment, the weather, and you. But even under the best of situations, radar isn't perfect, and that is no insult to the system. It isn't intended to put you on the runway with your eyes closed. It has earned its keep when it puts you into a position from where you can see the runway visually. That is why it is called Ground Controlled APPROACH system.

—Operations Bulletin, Airfield Command, USAAC.

MUCH IN THE form of rumor has been heard and discussed about the Rogers Board which was convened January-March 1960 at Ft Eustis and later at Ft Monroe, Va. Questions are frequently heard as to just what the Rogers Board was and what its results were. In an effort to answer such questions, the following article has been submitted by Lt Col John W. Oswalt who was the Chief of the Operational Analysis Team in Phase I of the Board's deliberations and a member of the working group through all three phases.

His article discusses actions which led up to the creation of the Army Requirements Review Board which later came to be known as the Rogers Board. Information contained in the article should be of general interest to Army Aviators regardless of present assignment. It is necessarily considerably abbreviated due to security classification of many facets of the Board's deliberations and conclusions.

Report on the "Rogers" Board

Lieutenant Colonel John W. Oswalt, Arty

IN MAY 1959 the U. S. Army Aviation School, at the direction of USCONARC and Department of the Army, completed a study called the "Development Objectives for Army Aviation 1959-1970." It included forecasted organization of Army Aviation, doctrine, and a proposed family of seven manned aircraft plus two drones. Before this staff study was completed, Department of the Army decided that in view of long development lead time something should be started immediately on development in the more critical areas.

Using the Army Aviation School study as background, a conference called at CONARC by Office Chief of Research and Development, DA decided that the areas which should be given priority for development were these: a new light observation aircraft (LOA) to replace the L-19, H-13/23; a new heavy observation aircraft (HOA) to carry a multisensor package for aerial combat surveillance and target acquisition; and a heavy tactical transport (HTT) for mobility and hauling from the rear of a field army area as far forward as possible without a forward area complex or signature runway.

The army study requirements (ASRs) were for the LOA, ASR 60-1; HOA, 60-2; and HTT, 60-3. Industry was invited to submit studies on any or all of the ASRs. Through this media the Army would be able to review industrial advancement to see what industry felt it was capable of producing to satisfy each requirement.

In the LOA area, the Army needed to determine whether one aircraft could reasonably perform the missions of visual observation, reconnaissance, and command control (liaison) now performed by the L-19 and H-13/23. In earlier coordination by the Army Aviation School with the combat arms users, requirement was expressed, without exception, for a vertical riser for the tactical user in the forward area. This was dictated by the highly dispersed and fluid battle area envisioned, in which battle units would be dispersed and interlocked by fire but not necessarily in contact. In such situations there would be no distinct forward battleline but rather a series of islands of

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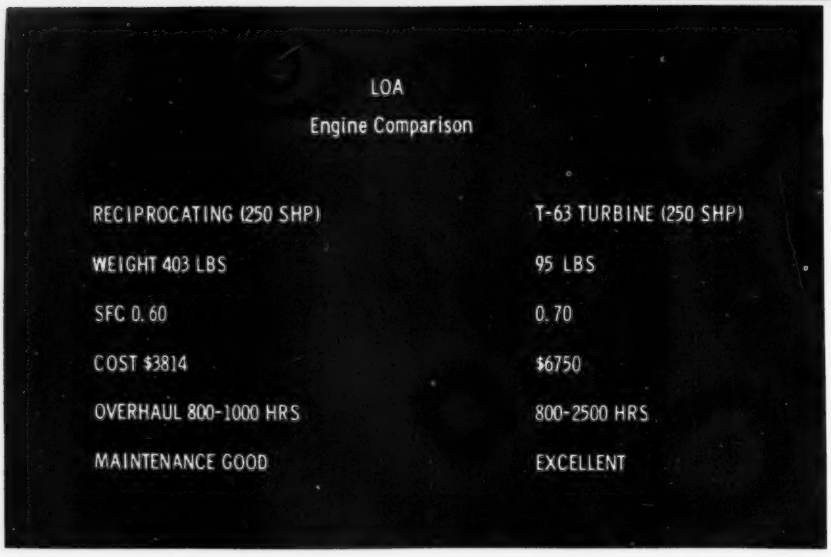


friendly forces with the possibility of intermingled friendly and enemy maneuvering forces.

An autogyro or STOL aircraft might be acceptable for this forward area use if it were substantially more reliable or cheaper than the pure VTOL aircraft. The aircraft would remain with the tactical unit it supported and would habitually operate without benefit of landing strip. It would have to operate in the field for long periods of time, requiring no more maintenance than that within the capability of one mechanic with hand tools.

A primary requisite was that it be highly reliable. If as reliable as expected, it would be integrated down to battle group, battalion and company level.

The L-19 is already over 11 years old in basic design; the H-13 over 15 years old. Certainly, rather than further product improvement, American industry should now be able to produce a highly reliable forward area supportable helicopter with good performance to replace both the L-19 and the H-13.

A major amount of our L-19 and H-13 aircraft were built during the Korean conflict and will be over 15 years old before the new LOA can be delivered in any great quantity. With the normal development cycle of design competition, selection of a winner or winners, production and test of X (experimental) and Y (user test) models before letting production contracts, it will be beyond 1965 before any quantity of the new aircraft will be delivered.

If the uses and requirements for light observation aircraft continue to expand as they have in the past 10 years, the new aircraft may not be available in sufficient quantity to replace all or even most of the L-19s and H-13s by 1970. An earlier date was not realistic, considering development and testing time required (i.e., X Model by 1963, Y Model by 1964). As a goal, full scale production of 500 aircraft per year was to start in 1966. Thus, by 1968 the Army might have approximately 1,200 of its new LOA aircraft.

DCSOPS DA presented four possible courses of action. Course of action II was selected as a point of departure.

Based on this course of action the requirement for light observation aircraft was to remain at approximately 3,600 from now until 1970. This was premised upon little if any increase in observation aircraft organic to the division over the next 10 years. Of the present inventory, approximately 1,500 aircraft are H-13/23s and 1,950 aircraft are L-19s. Losses due to attrition average approximately 24 H-13/23s per year and 30-34 L-19s per year.

If the new LOA is as reliable and as frontline supportable as intended and if the Army does reintegrate observation aircraft down to the battle group, artillery, battalion, etc., as planned, the total number of observation aircraft required should increase considerably. This increase in requirements will cause L-19s and H-13s (also L-20s) to be rebuilt or repaired as necessary to keep them flying much beyond their present programmed service life of 9 years. The C-47s and C-45s of the AF and Navy have been rebuilt in such a manner much beyond their originally planned service life.

The study operation which took place during the winter of 1959-60 became known by various names — Army Study Requirements Board, the Rogers Board, and finally the Army Aircraft Requirements Review Board. Industry responded by submitting 119 separate studies divided among the three study areas. These included tilt wings, tilt ducts, tilt rotors, ducted fans, lift fans, autogyros, helicopters, compound helicopters and fixed wing STOL aircraft of all varieties, powerplants and designs. Some studies defied type classification and were listed merely as unique. The review was conducted in three phases, starting in January and ending with a review by a board of ten general officers headed up by Lt Gen G. B. Rogers, CONARC

Deputy Commanding General for Developments.

The conclusions of the Army Aircraft Requirements Review Board were presented to and approved by the Army Chief of Staff in March 1960. It was recommended that immediate development be initiated to obtain a turbine-powered, highly reliable, 3-4 place helicopter with superior performance. Turbine power was specified because of the anticipated reliability it promised (i.e., Rolls Royce Dart — 2,200 hours between overhauls, etc.).

In a comparison of light turbines with comparable horsepowered reciprocating engines, even after amortization of development and production costs and extrapolation of the production cost curve into large quantity production, the turbine will cost approximately twice that of the reciprocating engine and will burn approximately 35% more fuel per hour. It will weigh only about one-fourth as much as the reciprocating engine. It is expected that reliability and consequent savings in maintenance personnel, parts, and downtime will more than compensate for the higher cost and fuel consumption.

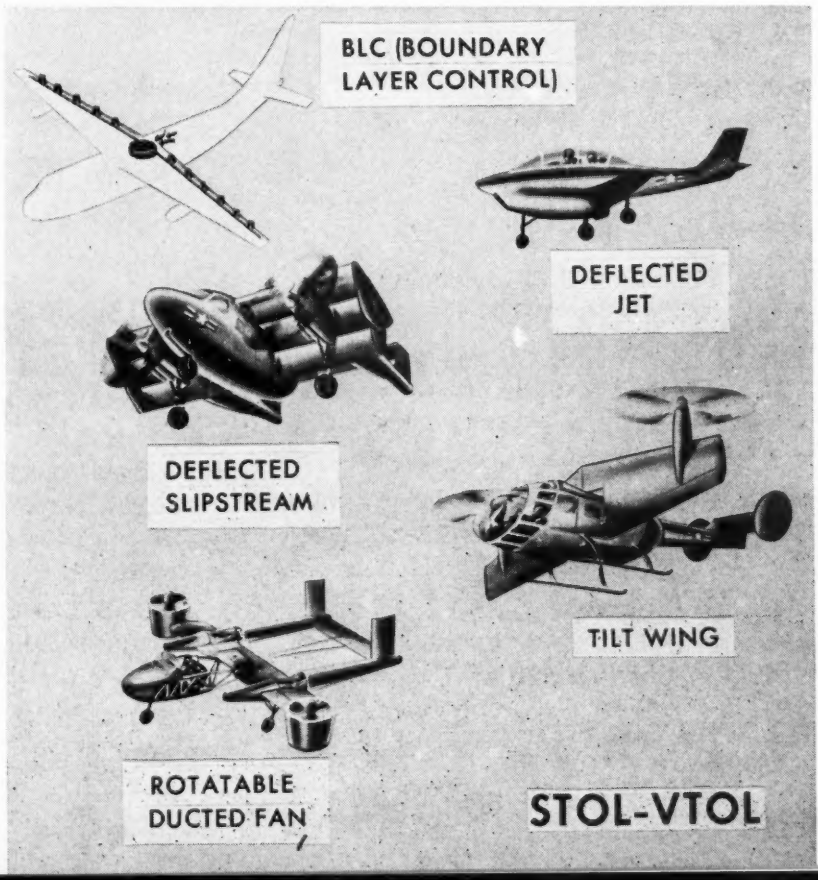
Analysis of turbine power application to an STOL type observation aircraft does not result in such a clear-cut case. It is harder to justify a turbine engine for an STOL fixed wing LOA. Fixed wing aircraft powered by a reciprocating engine normally operates at an economical cruise of about 60-65 percent BHP or lower. A turbine powered airplane would operate normally at about 90-95 percent BHP at cruise and would burn approximately twice as much fuel per hour. This plus an initial cost of twice as much per engine of comparable horsepower coupled with certain problems of lack of braking action or drag from the propeller on a split shaft turbine reason against use of a turbo-prop on the LOA. A reverse pitch propeller would offer a solution only at increased cost.

The Army Aircraft Requirements Review Board also recommended certain further studies and actions in the heavy observation aircraft and the heavy tactical transport areas. The former gave rise to the Man - Machine Project of the Army Aviation Board. This project has as its purpose investigation into problems connected with high speed low-level flight: gust loading on the aircraft, physiological effects on the crew, nap-of-the-earth navigation, low-level fuel management, ability to avoid breaking the radar horizon, pilot reaction time to flight hazards, etc.

In the area of the heavy tactical transport further study was to be made into use of the compound helicopter. The concept was for an aircraft which could take off at full gross load STOL in the Army rear area and, after burning off fuel, land vertically close to the ultimate destination without benefit of a landing strip or forward area complex. At reduced load the aircraft could take off vertically for any lateral movement of troops, equipment, or supplies. It would have a cruising speed and range exceeding that of the Caribou.

Regardless of the outcomes in these three areas of development, the Army may certainly expect further assistance in improving its capabilities for aerial mobility and aerial combat surveillance and target acquisition. □

Will our LOA, HOA, or HTT look like one of these?



THE
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AVIATION
ACCIDENT RESEARCH

TWX excer

H-34 ENTERED FOG, crashed and burned. Pilot suffered minor cuts and possible back injury; copilot, minor cuts; and crewchief, possible back injury.

H-23D CLUTCH SLIPPED. Aircraft touched down right skid first, bending the front cross tube and causing minor damage. No injuries.

U-1A VEERED OFF RUNWAY and caught left main gear in soft mud. Aircraft ground-looped, causing major damage to rear bulkheads and tailwheel assembly. No injuries.

H-13E ENGINE BACKFIRED, began running rough and lost rpm and power. Aircraft was autorotated into rice paddy with no damage. Five spark plug electrodes were found fused with lead and carbon deposits. All remaining plugs were badly coated with carbon.

H-13E SERVO FAILED, causing aircraft to pitch up and hit hard on rear of skids. Incident damage to aft cross tube. No injuries.

H-21C STRUCK WIRES while taxiing on parking ramp. Incident damage to aft rotor blade. No injuries.

YAC-1 LANDED LEFT of safety line and struck small tree, causing incident damage to left wingtip. No injuries.

H-21C STRUCK TREE while parking in tactical area. Incident damage to tip caps and all aft rotor blades. No injuries.

L-19E SKIDDED on ice while taxiing. Prop struck empty 55-gallon drum used as temporary taxiway marker. Light on drum not in operation. Incident damage. No injuries.

L-19A VEERED TO RIGHT during landing on icy road strip. Wheels engaged 12-inch snow, and aircraft nosed over to inverted position. Major damage to left wing, propeller, right wing, cowl, and vertical stabilizer. No injuries.

L-20A ON 19-HOUR VFR flight crashed into fog shrouded hill. Pilot, the only occupant, killed. Aircraft destroyed.

H-21C OIL PRESSURE DROPPED during flight and engine oil and cylinder head temperatures rose. Aircraft completed forced landing with no damage. Suspect engine materiel failure.

L-19 STRUCK SNOW and nosed over to inverted position during landing. Major damage to propeller, vertical stabilizer, rudder, left wingtip, and top of cabin compartment. Sudden engine stoppage. No injuries.

L-20A ENGINE FAILED IN FLIGHT. Aircraft completed forced landing with no damage. Cause of engine failure undetermined pending analysis.

H-13H SKID DUG into soft sand during landing. Aircraft veered to left, struck tree and came to a stop. Major damage to main rotor head, main rotor blades, transmission, and aft cross tube. No injuries.

L-23D MISSING on cross-country overwater flight. Extensive search conducted by air and sea forces with negative results. Pilot and copilot aboard.

L-23D LANDED WHEELS UP while practicing single-engine procedure and cartwheeled off left side of runway. Major damage to entire aircraft. No injuries.

xcerpts from dec. and jan.

L-19A TAIL GEAR caught on telephone wire during approach to tactical strip. Incident damage to tail gear spring. No injuries.

H-23D CRASHED, killing pilot. Aircraft destroyed. Apparently partial engine failure followed by attempted autorotation. Passenger seatbelt had not been secured and probably fouled collective bottoming.

H-13H FELL THROUGH during practice low-level autorotation. Incident damage to rear cross tube. No injuries.

HU-1A LOST RPM approximately 75 feet from ground. Aircraft struck ground, causing major damage to tail pylon, skids, cross tubes, transmission mount, tail rotor drive shaft, and main rotor system. No injuries. Fuel control governor seized in flight idle sensing position.

H-13H ROTOR BLADES STRUCK TREE during attempted autorotation in vineyard because of engine failure. Aircraft destroyed. Suspected fuel starvation. No injuries.

L-19A PROPELLER STRUCK ground on hard landing. Incident damage to propeller. No injuries.

L-20A RIGHT GEAR STRUCK powerline on approach to runway. Wire snapped and lashed back into right center section of flap, causing incident damage. No injuries.

H-23D ENTERED severe vibrations during hover. Aircraft was landed. Inflight damage to one main rotor blade tip assembly and mounting bracket. Vibration was caused by ice formation within one main rotor blade. No injuries.

L-19A STRUCK TREE during approach to tactical strip. Incident damage to left wing. No injuries.

H-37A STRUCK TREE during approach to strip. Incident damage to tip caps of all 5 main rotor blades. No injuries.

H-13E POWER DECREASED shortly after takeoff. Transmission temperature began to increase. Forced landing was made with no damage. Cooling fan was not operating and transmission was overheated. No injuries.

H-13H TAIL ROTOR FAILED during hovering flight. Major damage to tail rotor, tail rotor guard, and right skid. No injuries.

L-19A LOST CONTROL during landing roll on tactical strip. Major damage to left wing, left gear, and fuselage. No injuries.

H-21C SETTLED during approach to confined area. Blades struck branches of small tree. Aircraft completed landing with incident damage to aft rotor blades. No injuries.

L-23D GEAR LEFT hard stand while taxiing from runway to taxiway. Propeller damaged during contact with concrete edge of taxiway. No injuries.

H-21C LANDED nose high and tail cone struck ground during practice autorotation. Incident damage. No injuries.

H-13G ENGINE FAILED on final approach to confined area. Forced landing completed with no damage. No injuries.

H-23D OIL BREATHER FROZE due to extremely cold weather. Aircraft completed forced landing with no damage.

What Is An Examiner?

Major Robert G. Culbertson, Inf

THE FATAL DAY has arrived! This is the time when Army Aviators tremble in their Wellington's and contemplate their individual fates. This is the day the old instrument card MUST be renewed.

As you take those final halting steps towards the operations office, from out of the murk and gloom looms the most horrendous image imaginable; it defies description. It is the grinning, leering form of THE EXAMINER! A werewolf would be friendly by comparison. Your fate is surely sealed.

But suddenly, without reason or provocation, he smiles! What can this be? He is even more inhuman than you thought. He must take fiendish delight in gloating over the sacrificial lamb!

Then he speaks a word of welcome, and it appears that he may be almost human. If this is possible, what could have wrought such a change from the picture which has been so vividly described by others who have faced him?

* * *

To determine what kind of man is "The Examiner," let's review his special requirements and training.

Maj Culbertson is former commander of the Instrument Division, Dept of Adv F/W Tng, USAAVNS, Ft Rucker, Ala. Now attending the Command and General Staff College, he is dual rated with 3,200 flight hours.

TRAINING GOALS

The Instrument Flight Examiner Course has three training objectives for its graduate. He must qualify as an Instrument Flight Examiner, an Instrument Flight Instructor, and as an advisor to the aviation commander on matters pertaining to instrument flight and instrument flight training.

PREREQUISITES

To attain these objectives the student must bring to the course certain qualifications. Similar prerequisites are required of both the fixed wing and rotary wing instrument examiners. The differences are only those which deal with the separate categories of aircraft to be flown. Because the Instrument Flight Examiner Course is only 4 weeks long, a great amount of information must be covered in a short time. For this reason the prerequisites for attendance are maintained high. The complete listing of prerequisites may be found in DA Catalog 20-21. However, it is worthwhile to review the more important requirements.

1500 HOURS FLIGHT TIME

The responsibilities of an examiner require an individual who is capable of sound air sense and judgment. Many people are capable of demonstrating judgment in various degrees regardless of the experience or amount of flying which they have accomplished. However, the ability to build and improve one's judgment is basically derived from experience.

If it were possible to review all aviators and immediately conclude whether or not a man is capable, our job would be immeasurably easier. Since this is not possible, a minimum number of flight hours is required as a criteria that the potential examiner has developed certain judgment. It then becomes a matter of evaluation during the course to determine if the individual has attained the necessary judgment to fulfill the responsibilities of an instrument flight examiner.

10 HOURS WEATHER IN THE PRECEDING 24 MONTHS

This amount of actual weather experience is a distinctly small requirement. However, to require a large number of hours to include perhaps the holding of a Special Instrument Card would be ultra-restrictive and totally unfair to persons assigned to areas in which actual weather conditions are negligible. So the requirement has been modified to those criteria meaningful for successful completion of the course.

What are these criteria? The first is that the potential examiner has demonstrated that he can and will fly in actual instrument conditions. Second, and of much greater importance, is that he has an appreciation and some knowledge of the air traffic control facilities and their operation. This aspect continues to be of great importance throughout the course.

FLIGHT EVALUATION BY AN EXAMINER

The Instrument Flight Examiner Course is not designed to teach the individual how to fly instruments. Even though the potential examiner may meet all the necessary requirements, if he does not have the knowledge and demonstrated skill level to utilize all types of navigational and approach facilities, he is in a precarious position for attendance in the course.

The examiners in the field must carefully evaluate the applicant to ascertain that he has a complete knowledge of all types of facilities used in Army aircraft. Such an evaluation must be much more extensive and complete than an instrument card renewal examination. This is not to say that an individual preparing for an instrument card flight examination need not be prepared for any eventuality; however, his complete knowledge and ability need not be as high a caliber as that of the aviator who has applied to attend the Instrument Flight Examiner Course.

In essence then, the prerequisites are designed to accept only the best qualified instrument rated aviators for attendance in the Instrument Flight Examiner Course. Actually this objective has a twofold purpose. First, it ensures successful completion of the Instrument Flight Examiner Course. Second, upon return to his home station, the new examiner will be wearing a badge of distinction. He will be recognized for his ability and when the tough AI flights come up, he will be called upon, as the best qualified instrument pilot in the organization, to accomplish the mission.

EXAMINER TRAINING

After the potential examiner has arrived at Fort Rucker, what training does he undergo to meet the three objectives already mentioned? To appreciate the training, we need to investigate how the ground school supplements and complements the flight training in each of these phases. A re-

view of a few of the highlights concerning each of the objectives in the training program will best illustrate how these objectives are accomplished.

INSTRUMENT FLIGHT EXAMINER TRAINING

Needless to say, this is the portion in which the flight line plays the greatest part. The flight training is divided into two stages of training. In Stage I the individual demonstrates his ability as an instrument pilot. During this period, the instructor works with him to correct minor deficiencies and bring his ability to a high point of competence. The ground school cooperates by presenting subjects which give the student a greater understanding and appreciation of functions and actions of each of the air traffic control agencies. When Stage I is completed the individual should be an extremely capable instrument pilot with a full understanding of what each ground facility is doing to help a pilot accomplish an instrument flight.

During the initial days of Stage II the fledgling begins the process of understanding the sequence and manner of issuing clearances. Two students practice on each other to develop the student examiner's ability to issue clearances and evaluate flight performance. At the same time the "buddy" student attempts equally hard to trap the "examiner" into irreparable situations. Perhaps this is the origin of some of those weird clearances you have been given. At the conclusion of each flight, the debriefing and evaluation of the student examiner is carefully analyzed to observe his ability to recognize errors and evaluate performance.

As Stage II continues the student is introduced to the conduct of the instrument flight examination. The ground school again dovetails their training to acquaint the student with the specific requirements in conducting the different types of flight examinations, as well as the completion of the necessary and inevitable paperwork.

As proficiency is gained the hopeful student examiner needs the opportunity to meet and evaluate the average instrument rated Army Aviator. To accommodate this need, aviators assigned to Fort Rucker willingly volunteer as "Guinea Pigs." Their purpose is to allow the student examiner an opportunity to demonstrate to his instructor his ability to issue clear and concise clearances, evaluate performance, and conduct an instrument flight examination. Some interesting discussions have resulted upon termination of a flight when the student examiner is evaluating the ride and being evaluated upon his evaluation.

This period of flight training totals 40 hours during the 4-week course.

INSTRUMENT FLIGHT INSTRUCTOR TRAINING

To adequately perform the duties of an instrument flight examiner 50 percent or more of his time will be spent in conducting flight instruction. The examiner is not assigned to his duties solely to administer a flight examination, but to assist in improving the Army Aviation Instrument Program. Paragraph 4, AR 95-67 states that instrument examiners are responsible for "assisting the President of the Instrument Flight Examining Board in coordinating and supervising all instrument flight training and related activities conducted within the command."

Realistically the flight training presented in the examiner course does not fulfill the requirements to completely qualify the individual as an instrument instructor. However, on the basis of his experience and training for examiner duties, it is felt that self-improvement can be obtained upon return to his unit and assuming the full obligations of the instrument examiner. In addition, throughout the flight training phase the instructor is constantly dropping helpful hints to assist the student in performing his duties as an instrument flight instructor.

During the course, the ground school provides further assistance to the potential examiner in this area. The course stresses the need to evaluate unit requirements to maintain and improve individual instrument proficiency. To complement this evaluation, exercises are provided to assist the new examiner in establishing a training program to meet the needs of the command. Such information is developed as the type subjects to include, reference materials available, and assistance which may be obtained from the USAAVNS.

Not all situations can be covered under such a program. The objective is to make the examiner think about ways to accomplish this phase of his duties.

ADVISOR TO THE AVIATION COMMANDER

We may certainly assume that the examiner's training to

evaluate and prepare instrument training programs and act as an instrument flight instructor is of value to the aviation unit commander. However, another area is evident in which the services of the instrument examiner may be used.

Aviation units are being equipped with navigational aids to facilitate weather flights. However, all the fancy gear in the world cannot help the organization perform its mission unless it can be utilized. The aviation officer needs personnel who are familiar with the requirements necessary to ensure that the equipment may be properly used. The examiner is trained to provide this service for the aviation commander and his organization.

Training in the ground school is devoted to familiarizing the student with the requirements necessary to establish and operate a navigational approach facility. The students are introduced to the criteria for establishing approaches on all types of electronic aids used by Army Aviation at present. By the completion of this block of instruction the student has come to recognize the problems, where the detailed information may be obtained, and how to secure assistance in establishing facilities.

THE EXAMINER

By now perhaps our monster has taken on somewhat less of a ghoulish charm. It is our intent to train and develop an instrument flight examiner who will be an asset to Army Aviation and will assist in the improvement and progress of the Instrument Flight Program.

The next time you see your examiner don't wail and moan, run and hide, but enlist his aid. He will welcome the opportunity to discuss and assist you in your individual instrument flying problems. □

TRUTH *or* CONSEQUENCES

LIKE THE CHANT in the game of truth or consequences, "heavy, heavy hangs over thy head," the necessity for convening the accident investigation board poses a threat to the whole command.

But if the board takes the high-drama courtroom road they'll find it leads to nowheresville. By swearing in witnesses to tell the truth, the whole truth, the board thwarts the very thing they should be seeking: the true cause of the accident.

This truth attack has no place in an aircraft accident investigation, when the purpose is seeking to pinpoint the reason for the accident, not the blame.

The commanding officer with

Prepared by the U. S. Army Board for Aviation Accident Research.

savvy, faced with the unpleasant task of an aircraft accident investigation, realizes that the way to get to the bottom and sides of any accident — no matter how picayune or how fatal—is to get the persons involved to talk without fear of consequences.

And consequences take many shapes. The pilot, mechanic, copilot or supervisor who fears loss of professional reputation or a bad efficiency report will take the natural out and avoid any recounting of the accident that might reflect on his performance.

Conducting an investigation along the lines of a Perry Mason grilling will not reveal pertinent unvarnished facts. A friendly roundtable might.

In civilian aviation the heated glare of publicity often hinders accident investigation, prejudicing testimony, creating whitewash jobs, and blocking investigators after the facts.

While actual CAB reports may not be admitted as evidence, the hearings are open to the public and are widely used as blueprints in litigation. It is a simple fact of life that if a passenger thinks he might collect damages or crew members feel they might be "hung," testimony will be colored.

The aircraft accident investigation for the military should be handled carefully and the wise commander will use this opportunity to get at the truth with the idea of preventing future accidents. It is not "how" the airplane crashed but "why" that is of paramount importance. The commander who realizes this improves the operational capability of his air section and the efficiency of his organization.

Once the idea that the pilot must pay for what he damaged became unrealistic in dollars and cents, a new era dawned for accident investigation. Pilot error coupled with "let him pay for it" became as old hat as the Jenny. We like to think it was followed by an enlightened period rife with pure accident research, where the real cause of an accident was brought to light and preventive measures taken immediately to stop similar incidents.

This has not always been the case, however. Not long ago the Aviation Accident Research Board received an accident report containing 73 pages of sworn, recorded testimony. Plenty of sworn testimony, yes —but did they get to the heart of the matter, the real cause of the accident? After analysis it was decided that they had not.

Here the command attitude is vital, for to tell the truth might get the crew in trouble with the old man. But, if the old man realizes that **to tell the truth** may save future lives and future headaches, his desire for disciplinary action may well switch to a desire to find the cause to prevent similar accidents under his command.

Under the Federal Aviation Act of 1958, certain proposals in section 702 deal with military aircraft investigation. It states in part: "It is of the utmost importance that all personnel understand and appreciate certain significant differences between an aircraft accident safety investigation and an aircraft accident legal investigation; otherwise the desired purpose and the necessary effect of these two separate proceedings are obscured."

In this article we have been referring only to the aircraft accident investigation (safety); i.e., those investigations conducted solely for the purpose of accident prevention.

The FAA proposal further states: "A safety investigation is always conducted. In the proceedings for the aircraft accident safety investigation, the testimony (either oral or written) of a witness who is involved in the accident or a statement of a person who made an observation related to the accident, are not necessarily made under oath, and are obtained under assurance that the testimony will not be used in connection with any legal or punitive action.

"This assurance is given so that the safety investigation board is provided quickly with complete and truthful information of the circumstances surrounding an accident. Without this assurance, aircraft accident prevention programs and their effect would be severely compromised . . . a witness might withhold certain important evidence by invoking the protection of his constitutional rights as to testimony of self-incriminating nature, and thus actual accident cause factors would remain hidden and accident preventative measures would be inadequate."

To quote further: "In addition the witness is not limited to 'nothing but the truth,' but is invited to conjecture as to possible accident cause factors."

Putting a proper cap on it, one might say that courtroom grilling of witnesses makes for good TV, good movies, and high drama on stage, but does not produce the goods if you are looking for the cause of an air crash. □

The TATSA Story

Lieutenant L. W. Mays, TC

COMMONLY KNOWN as TATSA, the U. S. Army Transportation Aircraft Test and Support Activity was activated 1 July 1956 by Department of the Army General Order Nr. 26. This established TATSA as a Class II Activity under the jurisdiction of the Chief of Transportation to be located at Fort Rucker, Ala., and assigned to the United States Army Transportation Materiel Command, St Louis, Mo.

TATSA commenced operations to provide evaluations of logistical tests in accordance with AR 705-40.

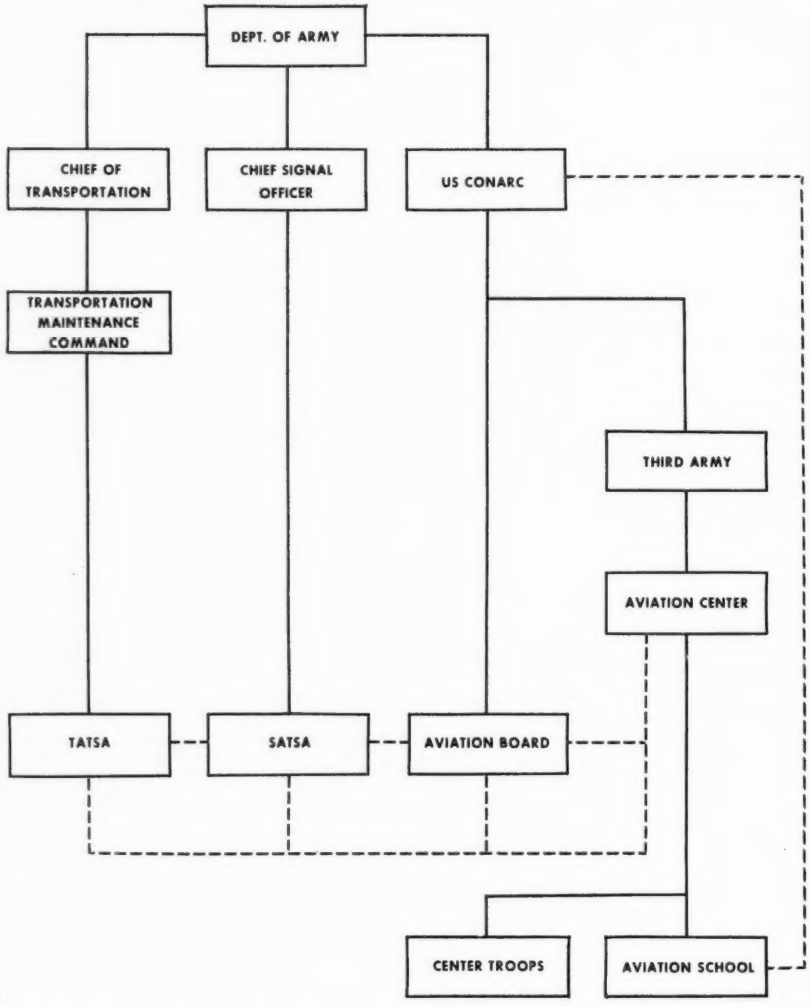
Testing is accomplished by military and civilian personnel within TATSA, as well as by contracting for maintenance performed on assigned aircraft. In most cases TATSA deals directly with the manufacturer and maintains its own warehouse supply operations for all supported programs.

TATSA's specific missions are to conduct flight tests on Army aircraft so that approximately 1,000 hours of flying time can be accumulated as rapidly as possible; to determine component service life and inspection cycles; make aircraft more serviceable, easier to maintain and support, to advance aircraft serviceability, maintainability, and supportability through improvements in technical publications, procedures, development of quick-change kits and modifications; to determine the requirements for manpower, tools, equipment, and skill.

To verify the adequacy of special and common tools and equipments; to confirm echelons of maintenance and the training requirements therefor; to develop repair parts consumption data for use during provisioning and supply control; to develop maintenance and operating cost data, and to enable the Commanding General, U. S. Army Transportation Materiel Command to evaluate the results thereof; and to supervise contractual field maintenance support of the U. S. Army Aviation Board and U. S. Army Signal Corps Aviation Test and Support Activity.

Logistical evaluations by TATSA are conducted under rigidly controlled conditions developed and improved through continuous analysis of the type and degree of logistical data required by DA for air items. No two programs have exactly the same requirements.

TATSA's role in the testing field started with an accelerated 1,000 flying hour program on the H-37 helicopter. This project was completed in 128



Before his recent return to civilian life, Lt Mays was assigned as a project officer with TATSA. He is fixed and rotary wing rated and instrument qualified, with approximately 2,200 flight hours.

calendar days. During this test TATSA pilots were flying the H-37 every hour it was not in maintenance, every day, holiday, and weekend.

This schedule was deemed too strict for pilot safety by the Flight Surgeon, so pilots for the Caribou and Mohawk tests are scheduled to fly these aircraft 50 hours every week, weekends and holidays included. This means that TATSA maintenance crews still work around the clock to keep the aircraft available. If TATSA pilots fly 50 hours in 5 days they call it quits for the week, but sometimes the entire 7 days are required to meet this schedule. The 1,000-hour H-37 program resulted in TATSA receiving the American Helicopter Society Kossler Award for 1956.

TESTS ACCOMPLISHED

It is beyond the scope of this article to list all of the tests accomplished by TATSA; however, listed below are a few of the more important tests that have been completed.

- A 1,000-hour comparative logistical evaluation of the H-13H and H-23D helicopters. For this test a total of 4,000 hours was flown on 4 aircraft in less than 6 months.
- A 1,000-hour comparative logistical evaluation of the H-21 and H-34 in which a total of 4,000 hours was flown on 4 aircraft in 82 days.

(What's the difference between a **comparative** logistical evaluation and a logistical evaluation? The same procedures are involved, but in the comparative evaluation 2 each of similar type helicopters are evaluated to determine which type the Army will continue to purchase.)

- A 1,000-hour logistical evaluation of the YH-40, predecessor to the HU-1A helicopter.
- A 300-hour logistical evaluation on the Cessna YH-41.
- The first portion of a fuel standardization test, which involved two each L-19s, L-20s, H-13s, and H-23s. These eight aircraft were selectively operated — to the component change life of each engine on 115/145 grade fuel with and without additives. The immediate purpose of this test was to determine whether these aircraft could operate efficiently on a higher performance fuel than that for which the engines were designed. The ultimate purpose is an attempt to standardize fuel requirements for Army aircraft, thereby tremendously lightening the logistical burden.
- A 1,000-hour logistical evaluation of the descendant of the YH-40, the HU-1A Iroquois which embodies numerous design improvements.

JUST WHAT IS A TATSA LOGISTICAL TEST?

It is a test to determine the necessary logistical support requirements to properly maintain Army aircraft. It is measured in terms of manpower, parts, fuels and lubricants, and tools and procedures. Logistical testing also assists the Army in having the required number of mechanics with the right tools and supply parts in the right place at the right time.

Data derived by logistical tests permit proper programming for spare parts support, determination of realistic operating expense data and scheduling of maintenance at proper levels—consistent with the capabilities of the various echelons of maintenance. Such data also aids in the preparation of necessary technical manuals based on proved techniques and sound technical information.

Two important by-products of the logistical test must not be overlooked. (1) The very nature of the tests involves the rapid accumulation of many hours of service experience. Logistical tests reveal areas of faulty or inadequate design. These can be brought to the attention of the manufacturer and corrected before the initiation of quantity production. (2) These tests provide a golden opportunity for proving (or disproving) the ability of time change components to accept longer service tours. This aspect is particularly important in tests of helicopters.

HOW?

Now, how is a logistical test accomplished? One or more (usually two) aircraft are assigned to TATSA for testing. TATSA establishes a test program which will duplicate, over a given number of flying hours (usually 1,000), the anticipated flying program which this type aircraft will encounter in field use over a similar number of hours. In other words, TATSA establishes a load, power, and mission profile which is considered to be typical of the potential field use.

Along with these controlled conditions, records are kept of all significant logistical data, such as fuel and oil consumption, parts usage, maintenance manhours, types of maintenance, all conditions requiring unsatisfactory reports, and sufficient flight data from the aircraft instruments and load data to assure us that the load, power, and mission profiles are being flown as programmed. This data recording is, of course, the heart and soul of

our program. It not only provides TATSA with the basic information we are seeking, but allows TATSA to establish, at an early period, norms in each of the areas being studied, and the ability then to detect at an early stage any deviations from these norms.

A recent example of the TATSA test is the full scale, accelerated logistical evaluation of the YAC-1DH Caribou transport aircraft. This project involved 1,000 flying hours on each of two aircraft so as to obtain an approximate equivalent of 3 years normal operational wear and tear in as short an elapsed time as possible. This operation provides essential logistical planning data and information. The following specific areas were investigated:

- Airframe, powerplant, and installed equipment component tour verifications and determinations of detailed daily, intermediate, and periodic inspection requirements.
- Improvement in the aircraft serviceability through improvements in technical publications, maintenance and inspection procedures, development of quick-change kits, and the development of various airframe modifications.
- Determined the manpower, special and standard tools, servicing and support equipment, and maintenance and inspection skill requirements to support the aircraft.
- Verified recommended common and special tools and equipment to support the aircraft, and prepared recommendations for changes where appropriate.
- Confirmed echelons of maintenance and training requirements for maintenance personnel, and recommended changes where appropriate.
- Developed data and information on repair parts consumption, POL adequacy and quantities used, provisioning and supply control data, verification of source coded data, and reviews of supply documents to refine same as required.
- Developed controlled maintenance and operating cost data. In performing these logistical tests, a new concept of aircraft maintenance has also been developed at TATSA; and there is a great probability that it will be adopted throughout the Army. Basically, in this system the condition of the aircraft determines the maintenance requirements through flight hours completed instead of technical manuals being the dictator.

New terms have been introduced to replace old terms. The preflight inspection is now known as the flight readiness inspection. The pilot conducts a flight readiness inspection to determine whether or not the aircraft is safe to perform its prospective mission, and the minimum number of systems or items in the aircraft are checked to determine whether the aircraft is in a safe, flyable condition. The daily inspection takes the place of the old postflight inspection and is performed by maintenance personnel. The intermediate and special inspections take the place of the old weekly and periodic inspections.

The basic difference between this concept and the old maintenance concept is the attempt to alleviate duplication of effort and the needless inspection of parts which are known to be well within tolerances.

There are five key elements of a good logistical test program. First is the time, or phasing, element. Aircraft are notoriously long lead time items. Consequently, a test should be started approximately 9 to 12 months before the first production aircraft comes off the line.

Second, and intimately related to the first element, is the necessity for conducting the tests as rapidly as possible consistent with meeting all the objectives of the test. Logistical data must be generated in sufficient time for the results to be assimilated by the test organization. It is then passed on to higher headquarters for dissemination to the various elements in the Army that require this information before the Army commits itself on many of the items connected with introducing an aircraft into the system.

The third key element is that the data must be generated in such a manner as to assure validity of results. Several factors enter here. The aircraft undergoing test must be operated long enough to ensure the proper influence of operational aging. Also, as indicated earlier, the aircraft must be operated within the utility mission normally encountered in field operations.

Fourth, sufficient aircraft should undergo test to give reasonable assurance that a good "average" set of data is being generated. Finally, the testing agency must interpret and present the results with due regard for accuracy, validity, and utility of the published data.

Logistical tests, such as performed at TATSA, are a powerful tool for ensuring that the Army receives maximum benefit from its procurement dollar.

From The USAAVNS

DEPT OF MAINT

TEN YEARS AGO, when Army Aviation was very limited in size and number of aircraft, maintenance functions were relatively simple. Due to the rapid growth of Army Aviation and the placement of Army troops all over the world, it is impossible to expect aviation units to function under the old concepts. Army Aviation needs a training film on "Servicing Army Aircraft in Extreme Climatic Conditions." Such a film will soon be made in three 20-minute reels: Part I, "Cold Weather Areas"; Part II, "Desert Areas"; and Part III, "Tropical Areas."

The writer has been contacted and will begin the scenario for Part I in the very near future. It will include both fixed and rotary wing aircraft and will cover the procedures for protection, preheating, securing, inspections, storing fuels, lubricants, spare parts, and tools; the special procedures for protecting the instruments, engines, and plexiglass; and the removal of snow, frost, and ice. The film will demonstrate the major problems peculiar to Army aircraft operating in extreme cold weather areas.

Part II, "Desert Areas," and Part III, "Tropical Areas," should go into production in the near future and will cover all of the techniques and procedures that are peculiar to Army aircraft operating under these conditions.

The first of the films in the HU-1A training program have been recently released by the Army Pictorial Center. This series entitled "Army Aircraft Gas Turbine Engine Operation" consists of three films: Part I, "Principles of Operation"; Part II, "Controls and Instrumentation"; and Part III, "Construction and Operation of the T-53 Engine."

★ ★ ★

A technical writer is now working on the script for training films on HU-1A maintenance. Part I, "Main Rotor Assembly," and Part II, "Transmission Removal and Replacement," will be filmed in the very near future.

DOI

The USAAVNS received the first Mohawk during November and it is anticipated that pilot transition training will commence during the second half of FY 61. The initial input is programmed for approximately two students per class, with a new class reporting every three weeks.

★ ★ ★

The 3-week course length for the "Army Aviation Medical Officers Orientation Course" has been approved. The new program of instruction provides for orientation flights in all types of fixed wing and rotary wing Army aircraft. The medical officers will ride through all maneuvers expected of a student pilot during the L-19 orientation flight, to include maximum performance takeoffs and power approaches. He also receives instrument instruction in the synthetic trainer and the L-20 aircraft. The final phase of flight orientation is given in the H-13 and H-34 helicopters. The medical officers follow the instructor pilot on the controls as he demonstrates the capabilities, limitations, and emergency procedures of each of these helicopters and the maneuvers a student pilot is expected to perform.

DEPT OF R/W

To prevent further electrical shocks from static electricity, crew-chiefs and ground handlers will be guided by the new revision of Appendix 19, FM 1-100. This revision explains the use and fabrication of the "Static Electricity Discharge Probe." This probe is comparatively simple and is to be manufactured locally.

DEPT OF TACTICS

The tactical portion of the AO-1 Mohawk Transition POI has been completed. The total length of this course is 10 weeks. Initially the aviators receiving checkouts will receive only 8 weeks of instruction. The variance is caused by the shortage of supporting ground equipment and AO-1B aircraft. This means that the first Mohawk aviators going to the field will have received tactical training using only the AO-1A Mohawk. Some of the high-

lights of this course include mission planning, day and night aerial photography, familiarization with aerial electronic sensors, low-level navigation, and a field exercise.

★ ★ ★

The Employment Branch is nearing completion on a block of instruction for combat surveillance. This instruction will give all aviators a familiarization course on the capabilities and limitations of all current aerial sensory devices and the proposed infrared detector and low endurance drone systems. Employment concepts of the Aerial Surveillance Platoon and its elements will also be covered.

★ ★ ★

The Employment Branch has recently replaced its instructional blocks of "Combat Air Traffic Control" with the CONARC approved Army Air Traffic Regulation and Identification system (AATR&I system).

Close coordination was effected with the Combat Developments Office, the U. S. Army Aviation Board, and field elements of the 21st and 6th AAODs to provide a workable solution to the 1959-1965 time frame combat air regulation problem.

The solution emphasizes nonregulated, flight plan free, VFR operation within the division boundaries and forward of the FEBA below an assigned altitude. The employment of a highly mobile communication center, within the division area, is discussed to effect rapid clearance for IFR flights. The system is organized to achieve the required identification for air defense elements on VFR flights operating outside of the division free zone.

DEPT OF PRI F/W

The TL-19 A & E models used in primary training, while possessing many fine qualities as training aircraft, have been found to be out of c.g. (center of gravity) limits when the aircraft is flown solo. This undesirable condition is most critical during the pre-solo and first 35 hours of instruction, due to the inexperience of the students. To improve performance and safety, tests are being conducted to determine if this condition could be overcome without extreme modification.

In September 1960 a series of tests began, to include a total of four officer Fixed Wing Aviator classes: 61-2, 61-3, 61-4 and 61-5. These four classes flew (or will fly) all solo missions for their first 35 hours of instruction in TL-19 A & E models that are equipped with a 15-pound lead weight strapped to the tailwheel spring. This weight exerts sufficient force to bring the aircraft back within c.g. limits. Upon completion of their first 35 hours of instruction, the students are transitioned into aircraft without the weights.

This series of tests is being continued and results will be completely evaluated upon the graduation of OFWAC 61-5, 28 April.

DEPT OF P&NRI

FM 1-60, "Army Aviation Air Traffic Operations Tactical," dated August 1960, is now available to all units and individuals requiring its use. The manual is a guide for commanders, staff officers, and other individuals concerned with Army air traffic tactical operations. It provides for the Army air traffic regulation and identification system, including command and staff responsibilities for air traffic regulation and the navigation system; air traffic regulation measures and procedures; identification and air defense measures and procedures; employment, capabilities, and limitations of navigation and communication equipment; and the functions of the Army Air Traffic Regulation and Identification (AATRI&I) system.

★ ★ ★

Users are encouraged to submit recommended changes or comments to improve the manual. Forward comments directly to the Commandant, U. S. Army Aviation School, Fort Rucker, Alabama, ATTN: AASPI. Comments should be detailed as to the specific page, paragraph, and line in which the change is recommended. To ensure complete understanding and evaluation, reasons should be provided for each comment.

★ ★ ★

A number of Army National Guard and Reserve units which have requisitioned instructional material from the USAAVNS Special Catalog on Staff Training Material for Reserve Components have written regarding the date on which they can expect to receive the material. The material, some of which is still in the process of being written, will be shipped to arrive at the requesting unit by 1 August 1961, since it is applicable only for FY 1962 training.

In last month's **Falcon's Nest** (under Dept of P&NRI) we stated the new AR 95 series superceded, among others, AR 95-32. This should have read AR **95-31.**—EDITOR. □

Flying Is Fatiguing

Colonel Spurgeon Neel, MC

A MAJOR MEDICAL problem associated with Army Aviation is fatigue. In spite of this fact, few appreciate the full extent and consequences of fatigue in tactical aviation operations. While Army Aviators do not fly at the extreme speeds and altitudes characteristic of the other services, they fly "all the time." Weight limitations and operational requirements preclude equipping Army aircraft with complex navigational aids, and frequently copilots are not available. Army Aviators fly a variety of missions under the most adverse conditions. Usually, the Army Aviator has other concurrent responsibilities, such as adjustment of artillery fire, observing enemy activities, laying wire, or the care of a patient.

Even between flights, there is little abatement of stress. Between fatiguing missions, Army Aviators live under conditions comparable to those of frontline infantry troops. They are rotated to less active areas upon a basis of a relatively long fixed tour, rather than upon a basis of the number and types of missions performed. This lack of complete relaxation between missions and the presence of certain unavoidable deprivations constitute a very real hazard to continued flying efficiency.

What is fatigue? It is almost impossible to define, and even more difficult to measure. It means many things to many people. Like electricity, it is usually discussed in terms of "what it does" rather than "what it is." The aviator should be aware of the effects of fatigue upon his efficiency; hence upon his proficiency and safety.

The concept of "skill fatigue" is most applicable to aviation. This concept distinguishes between the type of fatigue produced by continued hard physical effort, and that caused by work requiring minimal muscular actions but demanding persistent concentration and a high degree of skill. An essential element of this type of fatigue is that, although it **can be** performed, the desired skill **is not** performed unless particular care is taken.

In one classic laboratory study of the effects of fatigue upon flying performance, it was demonstrated that as fatigue increased: (1) timing of reactions deteriorated; (2) subjects became more willing to accept lower standards of accuracy and performance; (3) pilots did not follow the instrument panel as a whole; and (4) forgetting became more frequent. Of particular interest was the fact that there was a sudden increase in the number of errors toward the end of known-duration runs. The implications of these facts upon flying proficiency are readily apparent.

In practice, one must distinguish between "acute" fatigue and "chronic" fatigue. The former is temporary and is usually relieved by an ordinary night's rest; the latter is not relieved by usual rest periods and is therefore cumulative. In acute fatigue, symptoms predominate; while in chronic fatigue, objective signs appear. The several signs and symptoms of the various types of fatigue are summarized in the "Pilots' Check-List for Fatigue."

Prevention of fatigue in the operational situation is as im-

portant as it is difficult. Aviators and their supervisors must be aware of the problem and take every possible action to reduce its impact upon operations. Adequate rest (physical and mental) before and after missions is important. Missions should be rotated among available aviators to equalize the workload. Nonflying activities generate fatigue which influences subsequent flying performance. Care must be taken to avoid assignment of too many nonflying responsibilities to active aviators. Good personal hygiene and maintenance of optimal physical condition do much to increase the aviator's tolerance to fatigue. Supervisory personnel should become familiar with the signs of fatigue, and take positive steps to prevent its development.

The establishment of flying hour ceilings per unit of time has received much attention. This is an approach to the problem but no panacea. Due to the wide variation in the amount of stress produced by the different types of aircraft and missions, the number of hours flown per se is not a valid sole criterion of fatigue. Fatigue produced by nonflying activities is not reflected in the number of flying hours accrued. The matter becomes academic in the tactical situation where the mission dictates the number of hours that must be flown.

Fatigue is a significant problem in Army Aviation. It reduces pilot efficiency and contributes to reduced performance and aircraft accidents. The signs and symptoms of the several types of fatigue are characteristic and should be familiar to both aviators and their supervisors. Fatigue can be minimized by proper hygiene, good physical condition, adequate rest between missions, reduction in nonflying duty assignments, and judicious rotation of missions among available aviators. Mere establishment of flying hour ceilings will not solve the problem. Application of all leadership and personnel management techniques is required, but the results are well worth the effort. □

PILOT'S CHECKLIST FOR FATIGUE

ACUTE FATIGUE SYMPTOMS. Temporary—normal rest will eliminate.

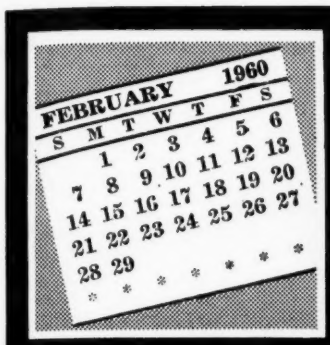
Physical fatigue.
- Physical exhaustion.
- Increased effort to carry out work.
- Increased rate of errors.
- Tenseness of body muscles; stiff neck; tremor.
- Tendency to doze; need of sleep.
- A feeling of "not being sharp."

Mental fatigue.
- Unusual difficulty in following instructions; things hazy.
- Need to recheck actions; uncertain about decisions.
- Diminished range of attention; deterioration in judgment.
- Acceptance of greater tolerances in instruments and controls.
- Acceptance of unnecessary risks.

Psychological fatigue.
- Vague headaches.
- Increased startle response.
- More frequent sighing.
- Irritability, fault-finding, impatience, temper flareups.
- Unusual preoccupation; forgetfulness.
- Sense of discomfort and failure.
- Boredom; loss of motivation; lack of group interest.
- Tendency to carelessness.
- Inability to concentrate.

CHRONIC FATIGUE SYMPTOMS: Prolonged, cumulative —normal rest will not eliminate.

Physical, mental, and psychological fatigue.
- Increased reliance on coffee, tobacco, and alcohol.
- Loss of appetite and weight.
- Social withdrawal; resentment toward others.
- Nonconformity; asocial acts.
- Decreased personal cleanliness.
- Insomnia, nightmares, radical change in sleep habits.
- Confusion; chronic anxiety; fearfulness; depression.
- Vague chest pains; difficulty in breathing.
- Vague visual and/or auditory disturbances.



CRASH SENSE

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH

February

THE MONTH had been bleak and wintery, with just a sniff of spring in the air. Someone announced it was leap year and to be wary.

Back at the Analysis and Research desk, the boys were muttering and mumbling, coding and sputtering. Like the ground hog they were testing the air, but for Army Aviation accident experience.

The picture was something like this: 4 strikes on the ground, 3 wire hits, 7 suspected engine malfunctions, 2 chalked up to lousy preflights, 1 wheels-up landing, 4 takeoff aborts, 2 obvious cases of poor flying techniques, 3 clobbered by flight path obstructions, and a number that defied classification. There had been 32 major accidents for the month.

Sound familiar? It should, for it was February 1960.

Someone suggested totaling the figure for dollar costs. There was a collective shudder, but they braced themselves, called for an adding machine, and came up with a figure: $423,000 was lost last February due to major Army aircraft accidents.

As has often been said, all the easy things in accident prevention have been said and done. It remains only for the hard things to be said and done. Learning by the accident experience of others should not be hard, but for some reason—due mainly to the it-could-never-happen-to-me-Mac philosophy—it is.

Just for the record, here are a few of the calamities which

After the wire strike

Before the fact

happened last February. Read them even though it isn't leap year, and take heed.

WIRE STRIKES, LAZY PREFLIGHTS

SIOUX STRUCK high tension wires during night flight and aircraft settled to ground. There were no injuries but damages totalled $14,000.

RAVEN CRASHED after it struck two telephone wires while instructor pilot was demonstrating contour runs. Instructor pilot and pilot suffered minor injuries; damages were $50,000.

SIOUX, FLYING at 150 feet above floor of gulch, was unable to avoid wires, attempted to fly under them. Rotor blades and upper mast assembly hit wires, but pilot was able to complete landing. Cost: $1,300.

PILOT PARACHUTED from aircraft after engine failed due to lack of lubrication. The oil filler cap and safety pin were left off, or not properly secured, at refueling point. No injuries. Damages: $18,000.

SIOUX RAN OUT OF GAS and pilot attempted to execute an autorotation into a cemetery. The H-13 struck a grave monument, causing damages amounting to $12,000. The pilot was lucky—he left the cemetery without a scratch.

RAVEN VIBRATED on runup and antitorque procedure was initiated by aviator and engine shut down. On examination, an engineer's tape was discovered wrapped around the tail rotor. The 1-inch drive was twisted apart about 4 inches aft of the universal joint. Used to mark

Fishtailed in flight

ground area, the tape had remained secure at time of approach because of frozen ground. During the lapse between landing and takeoff, however, the ground thawed and allowed nails to pull loose.

February weather is about as unpredictable as a comic valentine. But most weather in this month can safely be considered bad. Whether an aviator is flying north, south, east, or west, he can count on complications. Winds are gusty and uncertain; snow is still falling in many places. In recounting some of the major accidents of last February, snow and ice played a large part, especially in the landing or taxiing phase.

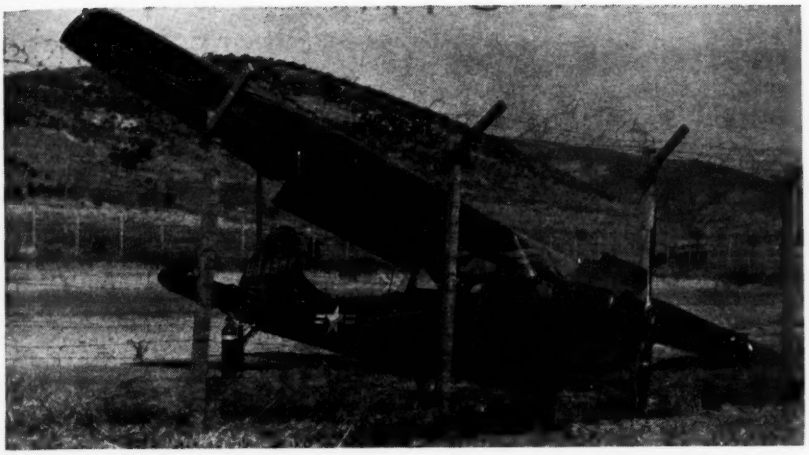
SNOW, WIND AND ICE

CHICKASAW VIBRATED severely and aviator elected to make an emergency landing. As the aircraft touched down in a cultivated, snow-covered field, with tail-low attitude, it went over a terrace, settling to the ground on both main wheels and left nose wheel. There was a suspected malfunction of the servo control assemblies. Damages added up to $16,000. There were no injuries.

BIRD DOG struck barbed wire fence at end of strip during go-around.

CHICKASAW FISHTAILED in flight following two loud noises and aviator made autorotation to snow-covered slope. The tail skid struck the ground, the aircraft rocked forward, and the main rotor flexed into tail boom. Damages amounted to $23,000. There were no injuries.

BIRD DOG ENGINE failed in flight and aviator made forced landing on edge of small frozen lake. The left wing struck a



Barbed wire foils go-around

bush and the landing gear caught in the snow. There were no injuries, but damages added up to $2,000.

BIRD DOG MOVED into take-off position and was caught by wind gust. Aircraft was lifted into a tail-high position and propeller struck runway, causing engine damage. Cost of repairs was $4,000.

INCIDENTS AMUSE

... but they also teach

The Naval flier, salty type, fixed his blue eyes on the Army Aviator and chuckled as he said: "You chaps amuse the devil out of us at the safety shop with your TWXs — prop tip damage, $10 — rotor blade tangles with bramble bush — aircraft hit toolbox — and so forth."

The Army Aviator explained that "incidents" are a vital segment of accident experience and prevention. To roll an HU-1A up in a ball costs Uncle Sugar some $296,000 at going rates. That brush with the bramble bush often gives a clue to prevention of this more serious type of accident. This can be of real significance with new aircraft in the inventory. Reports of unexplained flameouts, strange vibrations or noises, doors that fly open, unusual control reactions, etc., are necessary for development of prevention techniques. Unfortunately, the majority of such incidents go unreported, but the ones which create minor accidents or incidents are duly noted and recorded.

Goofups account for a great many incident-classified accidents. Twenty-six incidents were reported for the month of February last year. They range all the way from taxiing an aircraft into an oil drum to the monotonous loss of directional control during landings. Here are a few:

AFT SECTION of Chickasaw tail rotor drive shaft was found damaged by a bucking bar left in the tunnel during previous performance of maintenance.

CLAMSHELL DOORS of Choctaw came open in flight and bent back against main gear.

BIRD DOG was taxied into oil drum.

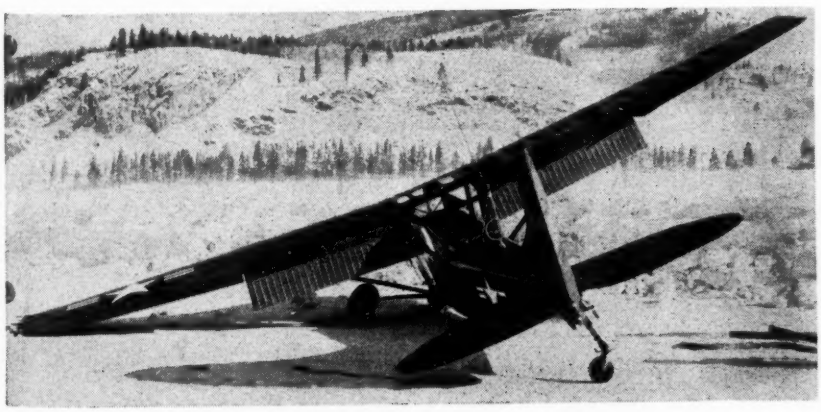
CHOCTAW CARGO DOOR lost in flight.

SEMINOLE HIT toolbox while taxiing. Tools were thrown into skin at nose wheel doors and forward nose section.

CHICKASAW CREWCHIEF threw static lines out of forward door. Lines were sucked up through forward rotor system, damaging one blade.

Take your pick of the above incidents. There were goofs and double goofs, but they were brought to light; and more than the persons involved can learn from them. How about YOU?

Good sledding



A fourth phone call did the trick. The operations officer at Woodruff even s o u n d e d pleasant when he told him he had a plane available. The major slapped his desk, the papers flew from his IN box and he smiled.

"Mac," the major nodded at his desk mate crouched over a shuffle of papers, "I'm off for the day. They finally broke one of their 23s loose at Woodruff. It'll take most of the day to get out there and get my landings and my time in."

Operations was calm for a change. The major filed his flight plan quickly and walked the l e n g t h of the concrete apron to the Seminole. Just back from a test hop, the crew-chief reported, after a trip to maintenance. The aircraft looked racy with its "see and be seen" orange touches. He completed his preflight, climbed aboard, and started the engines.

The major cleared with the tower, rolled into takeoff, and advanced the throttles slowly to 45 inches. The Seminole broke ground and he lowered the nose slightly, pulled the landing gear to UP. As he trimmed, he glanced over the instrument panel.

S c a n n i n g the sky as he c r u i s e d a l o n g, the major thought: "If it weren't for needing some landings, I could fly up the coast and sightsee." But he sighed and turned toward Redrun field.

The landmarks of the city showed up one by one as he cruised across town and to the outskirts toward the field. It was familiar, large enough and deserted — i d e a l for touch-and-go landings. He made his prelanding checks, turned base and checked to see if the landing gear indicator was in down-and-locked position.

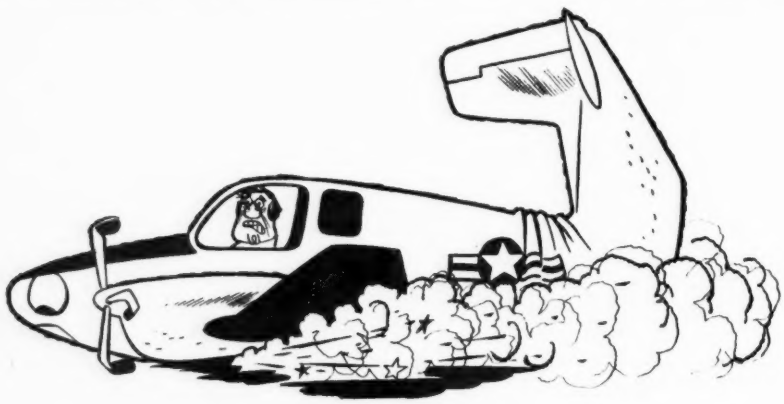
The touchdown was bumpy and the major frowned. He took off again, craning his neck to look around the pattern.

He turned crosswind, then downwind, and started the prelanding check. Suddenly, he was startled at the sight of another aircraft. He watched it closely as he turned base and final. When he was certain the other aircraft was well clear, he concentrated on making a smooth touchdown. Too late, he h e a r d the landing gear warning horn within seconds of touchdown. The L-23 bellied in and slid along the runway. The major stepped out, shaken, unscathed and very, very embarrassed.

How did he make a wheels-up landing? It's what every victim of this kind of accident must shake his head over. The overriding cause is a BREAK IN THE PATTERN. Either something distracts the pilot (such as a flock of geese or Vietnamese children on t h e runway) or he has broken his landing approach procedure for some other reason.

As in the case cited above, the touch-and-go landing process is probably the most vulnerable of all to wheels-up landings. With little time between takeoffs and landings, the pilot is as busy as the proverbial one-armed paper hanger, and it's easy to start wondering just what action was made last and then skip one.

All the jokes and all the cartoons can't ease the pain . . . or heal the plane. □



THINK BEFORE SPEAKING

Captain William T. Poor, Inf

WHATSAMATTER BUDDY? D'ya feel let down, depressed, nobody answers your radio calls? Called ARTC Center for the past two hours and after the first call you overheard the operator say, "Not another one of those"? Now you can't raise him even on the emergency channel? Well, don't jump yet; it may not be bad breath—it could be voice procedures. There's a cure for it.

Everyone harps on flying proficiency. A sometimes overlooked phase of flying proficiency is professionalism on the radio. With an increased volume of instrument and VFR flying, we cannot afford to allow decadent radio voice procedure to creep along with our improved flight methods.

Actually, improvements in voice procedure are keeping pace with other improvements in flying. Improved means of communication and procedures have been adopted by FAA, Army, Air Force, and Navy. But do we use these all the time? Have you ever requested a "right break" from traffic? I know some of you have, because I've heard it. The correct phraseology is, "Request right turn from traffic." This may seem a piddling error but when all these minute changes are made to voice procedures and totaled up, we find a conglomeration that is sometimes hard to understand.

I'm told that the English language is one of the most difficult to master. The way one person says a sentence or phrase may give an entirely different meaning to someone else. We cannot allow misinterpretation in control of aircraft in these days of aircraft-packed skies.

Rapidity of speech is an excellent trait . . . until words begin to run together into a meaningless mass of unintelligible gibberish.

Being forced to repeat a transmission obviates the few seconds garnered by too rapid a transmission.

Another failing on the part of some aviators is poor articulation. Even a slow southern drawl can be made intelligible with proper articulation. Careful enunciation of ALL the syllables with the accent on the right one is necessary.

Manuals for correct radio procedures are issued or are available to each aviator. There are supplements to these, such as "ATC Procedures" in Volume One of the Jeppesen Manual. You'll find a wealth of information in the Air Traffic Control Procedures, ATM-2-A, 1 Nov 60.* Seems to me that these manuals are not stressed or used enough.

Most of us have been on a radio at one time or another trying to transmit when someone else was monopolizing the channel with a long message that could have been shorter. Nothing is more provoking. It could get serious if there were an emergency. This is amplified in combat where every message counts. It is of the utmost importance that each transmission be clear, complete and concise. You must think out each transmission before transmitting. Know what you are going to say before you say it. We cannot be satisfied with just having good voice procedure. We must strive for perfection.

PRACTICE

Educators tell us that we learn by doing. This definitely applies to learning voice procedure. In fact, continual practice is necessary. Just like flying over the barrier, practice, practice, and more practice is necessary to get in each time and to remain truly proficient.

One of our bright spots is our control tower and GCA operators. Although we are newcomers in this field, a high level of proficiency in voice and ATC procedures is found in our tower operators. I believe it is as important for tower operators to maintain good voice procedures as it is for Army Aviators. In a sense it is an incentive; and we adopt the correct phraseology if we are used to hearing it. The control tower operator who allows himself to use illegal voice procedure may also tempt some aviator to backslide. For this reason the control tower operator must maintain as high a proficiency as he possibly can.

If we all pull together, we can easily become the world's best in the use of the radio. Nothing sounds better than a position report that is short, complete, and clear in content. This is professionalism at its best.

So take that ATM-2-A and Volume One of your Jepp and fill in the gaps in your knowledge. A key attribute of the professional is good voice procedure. □

Capt Poor is assigned to the Dept of Adv F/W Tng. He is dual rated, qualified as an Instrument Examiner and has approximately 1,800 hours flight time.

*The Air Traffic Control Procedures, ATM-2-A, 1 Nov 1960 is available to personnel through channels outlined in AR 95-14. It may also be purchased from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Grover E. Bell Award for 1960 Received By CDO at Fort Rucker

The Combat Developments Office of the United States Army Aviation School, Fort Rucker, Ala., has been honored with the Grover E. Bell Award for outstanding work in the field of helicopter development during 1960.

Maj Gen Ernest F. Easterbrook, Commanding General of the United States Army Aviation Center and Commandant of the United States Army Aviation School, accepted the award at the Honors Night dinner of the Institute of Aerospace Sciences in New York, 24 January 1961.

The Grover E. Bell Award was established by the late Lawrence D. Bell, founder of Bell Aircraft Corporation, in memory of his brother who was killed in an airplane crash in 1913. It includes a medal, certificate and two hundred fifty dollars. The purpose of the award is to foster and encourage research and experimentation in the important and relatively new field of helicopter development. It is given annually to the person or persons making an outstanding contribution to helicopter development during the preceding calendar year in the United States.

In accepting the award, General Easterbrook said, "We are truly elated that the Combat Developments Office has been officially selected as the fourth recipient of the Grover E. Bell Award.

"As you know, we in Army Aviation are most enthusiastic as to the future potential of the helicopter in the Army. The helicopter's versatility enables it to accomplish a great range of operational missions, and its capability as a weapons system is just beginning to be understood. This singular honor in recognizing the development being fostered by the Aviation School will do much to stimulate new ideas and new concepts."